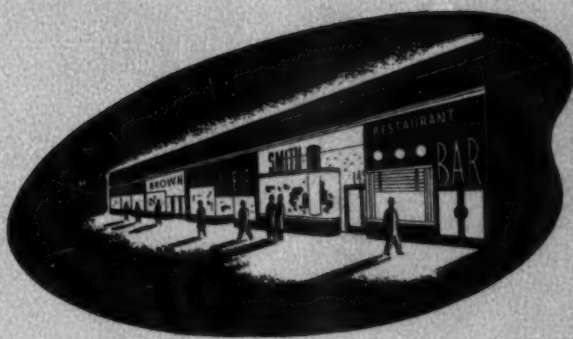


electrical contracting

*Industrial
Electrification*
SECTION
PAGES 35-46



AUGUST • 1940



HERE'S YOUR OPPORTUNITY

THOUSANDS of industrial plants are again on guard to prevent malicious destruction and espionage. While many companies are taking precautions to keep their factories free from trouble, others have postponed protective measures. Now is a good time to talk G-E protective lighting—floodlighting to protect their plants, to save their time and money.

The G-E distributor or sales office nearest you can supply the equipment you need. If you would like suggestions about a lighting plan for a difficult job, any one of our many lighting specialists will be glad to help you. Or write to General Electric, Schenectady, N. Y.

Thousands of factories need more light inside, too — to improve all-round efficiency and accuracy, speed production, and assure safety.



FOR YEAR-AFTER-YEAR NIGHT-TIME PROTECTION

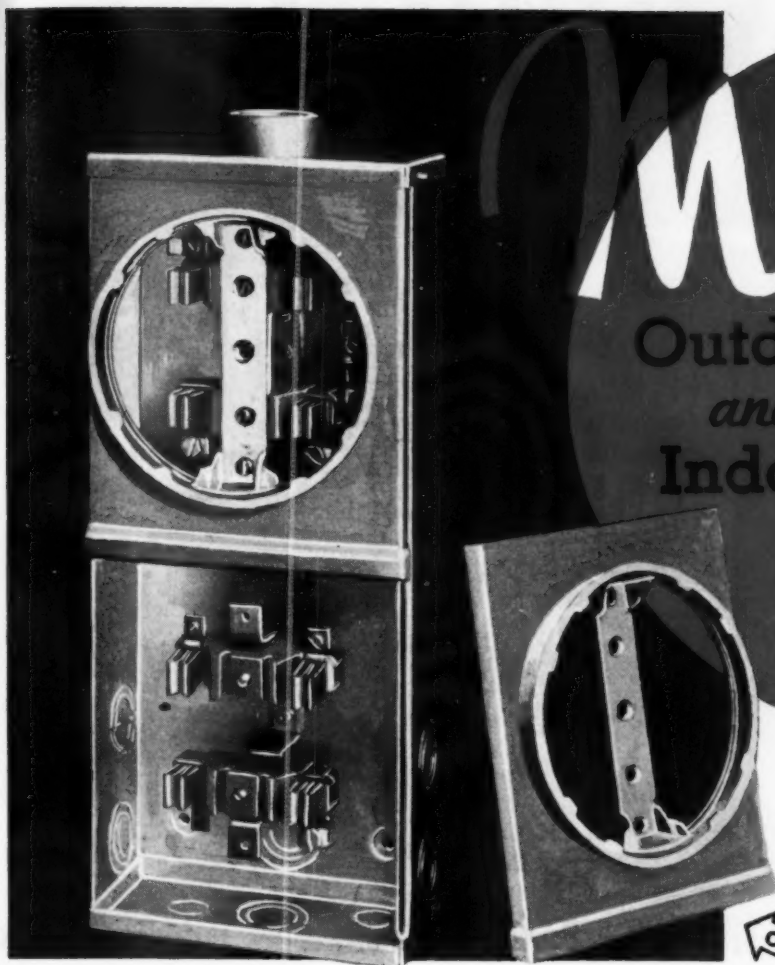
G-E low-priced spun-aluminum floodlights have a high efficiency that compares favorably with the more expensive copper-bronze or cast-aluminum floodlights. Several beam angles from 28 to 100 degrees and a variety of mounting attachments make these floodlights suitable for most floodlighting applications.



FOR LIGHTING FENCE OR PROPERTY LINE

The Form 79 luminaire is admirably suited for lighting fence or property lines because of its light-distribution pattern. Deflectors within the globe, or glass refractors, redirect a large portion of the light along and within the fence line. The stepped reflector makes possible the use of 500-watt multiple lamps.

GENERAL  ELECTRIC



Murray

Outdoor
and
Indoor

meter troughs

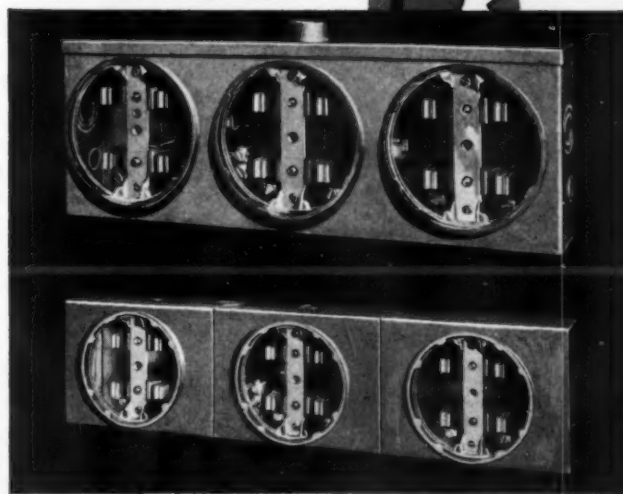
OUTDOOR

OUTDOOR

**"A 'cinch'
TO INSTALL"... say
CONTRACTORS
by the score!**

If ever a new line made electrical history ... this did ... and because ... INDOOR or OUT ... IT FITS EVERY SITUATION LIKE A GLOVE! IT'S THE SURE-FIRE HEADACHE CURE FOR EVERY CONTRACTOR. METROPOLITAN DEVICE CORPORATION, BROOKLYN, N. Y.

TYPES AND COMBINATIONS
TO SUIT EVERY WIRING JOB



INDOOR

METROPOLITAN
DEVICE CORPORATION
BROOKLYN, N. Y.

Send FREE, without obligation,
Catalogs of Murray Meter
Troughs and Switches.

FOR THE WHOLE STORY—MAIL

NAME _____

TOWN _____

STATE _____

WHEN PLANNING FOR

Consider These 3 Ways of Providing an Adequate Electric-power Supply Quickly—Economically

1. Put G-E Pyranol Transformers Indoors at Load Centers to Cut Installation Time and Reduce Costs

When you install new circuits, you can speed up installation and gain other advantages by using G-E Pyranol transformers.

1. Pyranol—the G-E cooling and insulating liquid—is nonflammable, and Pyranol transformers require no fireproof enclosing vault. You save time and the expense of vault construction.
2. By putting Pyranol transformers at load centers you avoid long runs of secondary wiring, thus further reducing the cost of new circuits. Furthermore, shorter secondaries provide better voltage conditions and lower line losses.

Write for Bulletin GEA-3377, "Ways to Save with Load-center Distribution of Electric Power."

A MODERNIZATION TIP

Frequently the capacity of your present wiring can be doubled or tripled by splitting it into short sections and installing a small Pyranol transformer in the center of each section. You avoid the expense of installing new secondary circuits and save up to 40 per cent of the cost of providing more capacity.

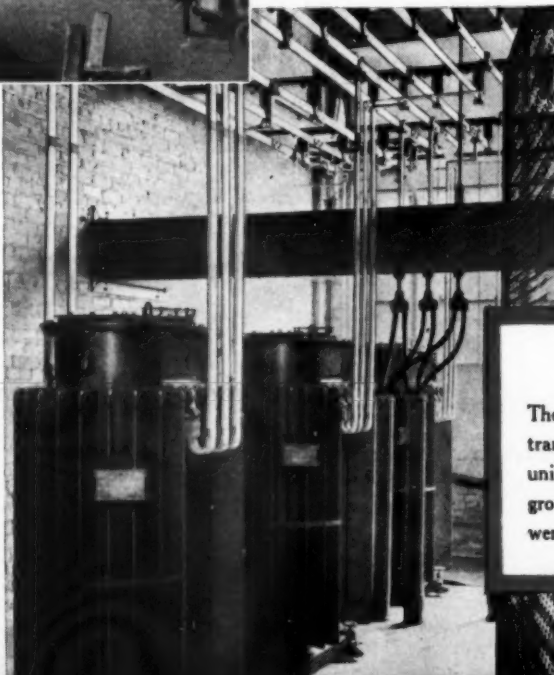
Write for Bulletin GEA-3180, "Load-center Transformers Aid Factory Relighting."

Avoided Cost of Underground Vault

The Byron Jackson Company, Los Angeles, selected Pyranol transformers for this 600-kva bank because the use of oil-filled units would have required the digging and lining of an underground vault in the production area of the plant. Again, there were savings in installation time and costs.

Saved \$500 on Load-center Installation

"We saved \$500 on installed cost by using a Pyranol transformer to supply a lighting load," says R. H. Lewis, electrical superintendent of the Motor Wheel Corporation, Lansing, Mich. No vault was required; installation time was materially reduced; valuable floor space was released because the transformer was installed on an overhead platform. Transformer rating: 100 kva, 480-240/120 volts.



INCREASED PRODUCTION

2. Improve Power-factor with G-E Pyranol Capacitors to Release Circuit Capacity

If the power-factor of your electric circuits is low, you can gain capacity quickly and at low cost through power-factor improvement with G-E Pyranol capacitors. Capacitors neutralize reactive kva (nonworking current) and permit wiring to carry more working current.

If you purchase power and your contract contains a power-factor penalty or kva-demand clause, you will obtain direct savings from power-factor improvement that may pay for the capacitors in from one to three years.

Write for Bulletin GEA-77, "Pyranol Capacitors for Industrial Applications."

Proper Voltage for Better Light

Proper voltage of the lighting circuit in this industrial engineering office is maintained by these 1.5-kva Type AIRS induction voltage regulators, installed on an overhead beam. Before the regulators were installed, voltage was low, and regulation poor, because power was supplied through long, heavily loaded feeders. Proper voltage is particularly important on lighting circuits because lamp output drops even faster than voltage.



Capacitors Release Circuit Capacity—Pay for Themselves in 13 Months

"In 1937 we were faced with the necessity of increasing the electrical capacity of our plant, owing to increased production," writes L. Clayton Hill, manufacturing manager, Murray Corporation of America, Detroit. "It seemed imperative to install new feeders in order to reduce feeder loading and improve low-voltage conditions. Mr. Calley, our electrical engineer, made an intensive study and decided this result could be obtained by installing capacitors. "1440 kva of G-E Pyranol capacitors were purchased. Feeders are cooler, voltage is better. With a total expenditure of less than \$13,000, our savings have averaged \$1,000 monthly."



3. Install G-E Induction Regulators to Plug Production Leaks Caused by Low Voltage

Circuits may be adequate from the standpoint of current-carrying ability, yet the addition of more lamps, motors, and other equipment may cause excessive voltage drop. This results in low voltage with a falling off in lamp and motor efficiency and a slowing of production.

Effect of low voltage on lighting can be further aggravated by variations in power loads supplied from the same source.

To bring voltage conditions back to normal and step up production, install low-cost G-E air-cooled induction voltage regulators for circuits of 600 volts and below—Pyranol regulators for higher voltages.

Write for Bulletin GES-2285, "What's the Answer?" when poor voltage hampers production.

ACT TODAY

Ask our representative for complete information about these time-saving, economical methods of obtaining an adequate power supply. He will be glad to study your needs—if necessary with the aid of our specialists in power distribution—and help you select the apparatus that best meets your requirements.

GENERAL ELECTRIC

402-14

IS THIS

FEATURE

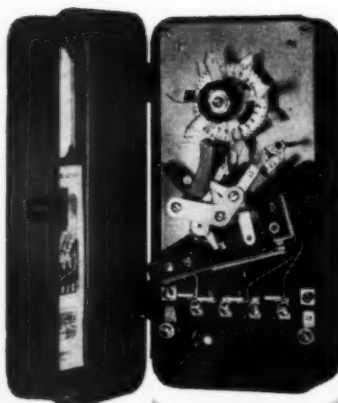
ON THE TIME-SWITCH YOU NOW BUY?

NO. 1
OUTDOOR



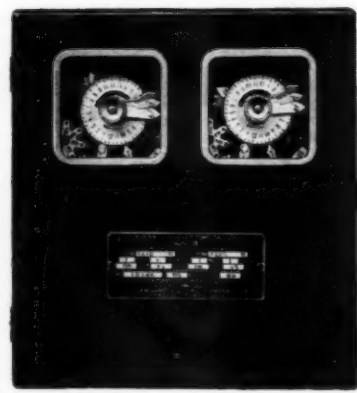
Form KAO. A completely weatherproof time-switch, available in all ratings.

NO. 2
TWO-CIRCUIT



Form KAY. The "on" and "off" operations of each circuit are independent.

NO. 3
DUPLEX



Form KADH. Two separate switch units are operated by the same timing mechanism.



An outstanding feature of Sangamo Time-Switches is the exceptional versatility of their basic design. This is partially demonstrated by the three illustrations above, the outdoor, the two-circuit, and the duplex forms of the KA time-switch. This switch is available in several other forms — yet, the simple, efficient mechanism remains fundamentally the same. In addition, Sangamo Time-Switches are available with a wide range of control features, enabling you to select those best suited to your individual requirements.

SANGAMO ELECTRIC COMPANY **SPRINGFIELD ILLINOIS**

electrical contracting

With which is consolidated The
Electragist and Electrical Record
Established 1901

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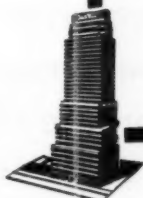
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A SERVICE PAPER for electrical contractors, engineers, motor shops, industrial electricians and inspectors, covering engineering, installation, repairing, maintenance and management, in the field of electrical construction — industrial, commercial, and residential.

BY GEORGE, THEY DO WORK! The engineer at the South side mill wants me to give him an estimate on a complete re-wiring job using Anaconda Duracode.

WELL, MR. DOUBTING THOMAS IT'S ABOUT TIME. You said it was all luck when I got that \$13,000 contract. But, now you know as well as I do that Anaconda's Survey and Guide helped.

You know, there's no reason why we can't get a lot more jobs. I remember reading where nine out of ten industrial plants in the country are losing money by putting up with inadequate wiring. And, what's more, estimates show that \$300,000,000 will be spent for Electrical Modernization this year.

Why, we'd be crazy if we didn't try to grab our share of that money!



Without obligation send me a copy of Anaconda's new Wiring Survey.

Company Name _____

Address _____

Title _____



If you are unable to obtain copies of the Wiring Survey from your Anaconda Distributor, use this coupon!

Visit the Copper & Brass Industry Exhibit in the Hall of Industry, New York World's Fair—1940.



USE MODERN IMPROVED

Anaconda Wire & Cable

ANACONDA WIRE & CABLE COMPANY, General Offices: 25 Broadway, New York City; Chicago Office: 20 North Wacker Drive
Subsidiary of Anaconda Copper Mining Company. Sales Offices in Principal Cities

AUGUST, 1940

Cut Worm and Crow

DOWN ON A FARM IN VIRGINIA, I have found much food for thought. A turkey hen sets on 30 eggs or more to produce a few birds for the table. A calf is fed for two long years before she has a calf herself and can be milked. And when the farmer plants his corn he drops five kernels in each hill—"One for the blackbird, one for the crow, one for the cut worm and two to grow." He must plan much for a little gain.

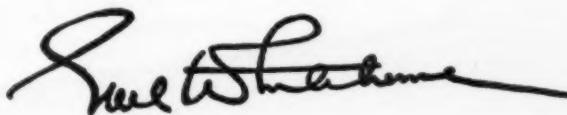
THINKING OF THIS, I MARVEL at the way we electrical contractors go on year after year expecting God to provide us with a comfortable volume of business. Because of the consistent rapid growth in the electrical industry, we are accustomed to it. We expect it. And when lean years come we are discouraged and aggrieved.

NO ELECTRICAL CONTRACTOR CAN AFFORD, these days, to play the old game of riding on the building industry. There will be plenty of new construction in the years directly ahead. We will bid on it. Each will get the share he is entitled to. But what security has he when he depends upon that alone?

OUR GREATEST CONCERN TODAY, as an industry, should be the development of electrical contracting as a business, largely independent of new construction. And that means more active attention to advertising, to selling, to specialization and the broader, more intimate service of customers to keep them electrically modern year by year. It means that the selection, securing and satisfying of customers will receive the same attention now given to engineering and production.

OUR BUSINESS IS NOW VITAL TO AMERICA. We are essential to national preparedness, to industrial progress, to the maintenance and advancement of the electrical industry. We must now meet the challenge by building ourselves stronger, making ourselves more prosperous. We must have the capital, the credit, the prestige, and the capacity for taking on these broader responsibilities, this bigger work our industry must do.

AND WE TOO CAN PLAY IT SAFE. It simply means that the competent electrical contractors of every community must work together to raise electrical standards in the public interest. And in our planning and our bidding, like the farmer, we will make more adequate provision for the cut worm and the crow.



HERE'S A 4-SQUARE PROPOSITION

from a "One-Call" Supply Source

1. MORE LIGHT ON THE SUBJECT

Your GRAYBAR Representative is out to furnish you with complete and frank information on electrical equipment and supplies. He's backed by a staff of specialists ready to shed still more light on specific problems of installation and operation.



... And speaking of "light on the subject": Check with GRAYBAR on the new Wheeler "Vapor-Proof" Fluorescent lighting unit and other fluorescent units for plant, office or store. Write for up-to-the-minute information.

3. FEWER MISSED SIGNALS

GRAYBAR's 71 years of experience in distribution has resulted in procedures of stock-control, order-filling and billing that cut annoying mix-ups to a minimum. Whether your order is simple or complex, "missed signals" are few and far between.

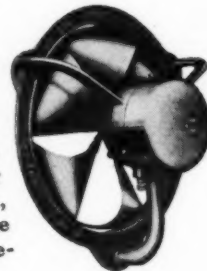
... And speaking of "signals": GRAYBAR is headquarters for all types of signaling equipment... Inter-Phones, Teletalk, fire alarm systems, bells, buzzers, etc. Write for help on any need.



2. LESS HOT AIR

The all-inclusive GRAYBAR line is too well stocked with "plus-value" items attuned to your needs to require a windy sales approach. The GRAYBAR Representative won't waste your time in indiscriminate "plugging" of products outside your requirements.

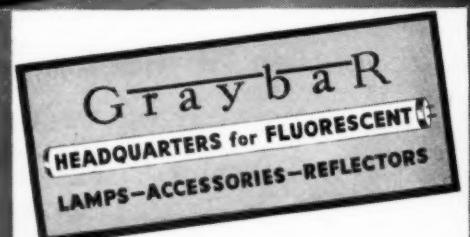
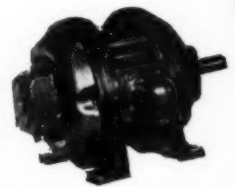
... And speaking of "less hot air": Ask GRAYBAR about the long-lasting ILG line of ventilating fans, blowers, and other units for disposing of heat, smoke, fumes, and the like. Bulletin on request.



4. SPEED TO SPARE

83 well-stocked GRAYBAR branches in principal industrial centers throughout the country speed up deliveries of standard equipment and supplies. For special items, GRAYBAR can assure prompt cooperation from its 200 supplier-manufacturers. A phone call brings "action service".

... And speaking of "speed": Whatever the speed, type or size of motor you need, GRAYBAR can supply it from the complete General Electric line.



Executive Offices:
Graybar Bldg., N. Y.
Offices in 83 Cities

By W. T.
Stuart



GENERAL LIGHTING in this modern machine tool plant provides light for critical finishing operations. Spacing is 10-feet, center to center. Units are 100-watt Cooper Hewitt fluorescent.

This machine tool plant job shows a trend in wiring methods, materials and design. Many of the ideas can be applied equally well to modernization of old buildings in this vital industry and also in other metal working plants.

... WIRING
FOR GROWTH
AND CHANGE

SUCH modern electrical wiring design characteristics as bus bar distribution, high intensity fluorescent lighting and messenger wire conduit suspension are usually associated with great multi-acre assembly plants. Good engineering practice and modern methods are no less useful and no less economical, however, in smaller industrial units.

The recently completed addition to the George Gorton Machine Tool Co. plant in Racine, Wisconsin is a practical example in a building of medium size of up-to-date methods for providing flexible, dependable and safe industrial power wiring combined with high level fluorescent lighting.

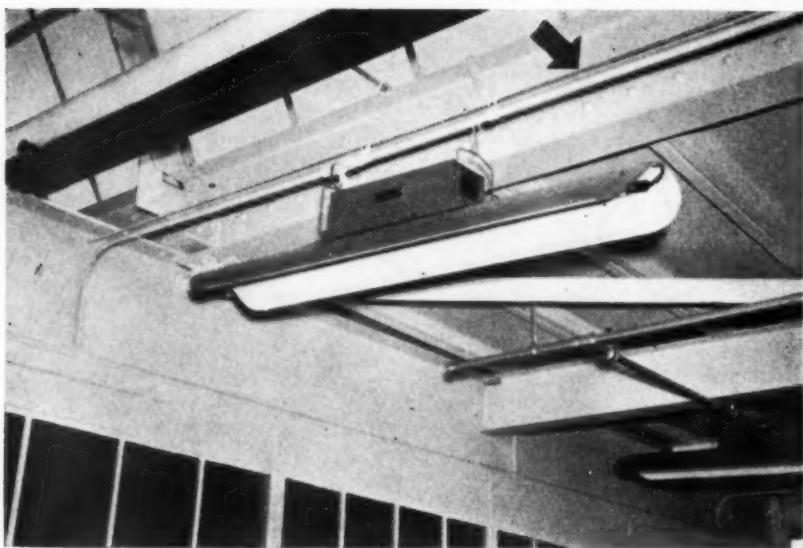
On this job the industrial architect, Albert Kahn, applied the same principles of electric wiring design that have characterized his world-famous automobile assembly plants. The electrical contractor Wm. H. Hetzel of Racine, matched this advanced engineering with equally fine technique and workmanship.

The building is approximately 190-ft. long by 60-ft. wide divided into two sections, each 30-ft. wide. One side is a crane bay extending the full length of the building. The remaining low ceiling area is divided into assembly area, stock room and crating area. Essentially, the production work in this building is devoted to assembly, testing, running-in,

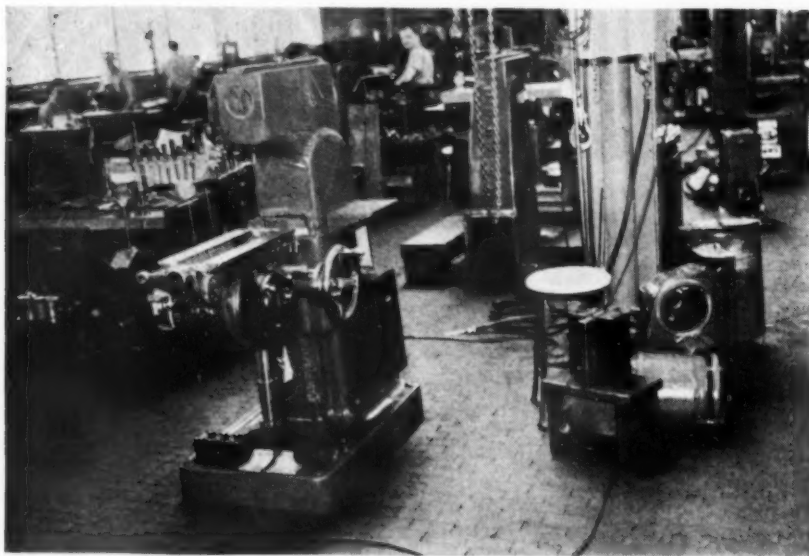
scrapping, painting, crating and shipping of machine tools.

Electric power is required for the crane and other hoists, portable tools, running-in new machines, and for operating wood-working machinery in the crating department. Plant expansion will eventually proceed through the new addition bringing production tools into the present assembly area and pushing assembly and shipping ahead to further building additions.

The precision assembly and finishing work required general lighting of approximately 30 foot-candles. The power and light feed is provided by a 4/0, 3 wire, 230-volt, 3 phase delta circuit from the main switchboard, terminating

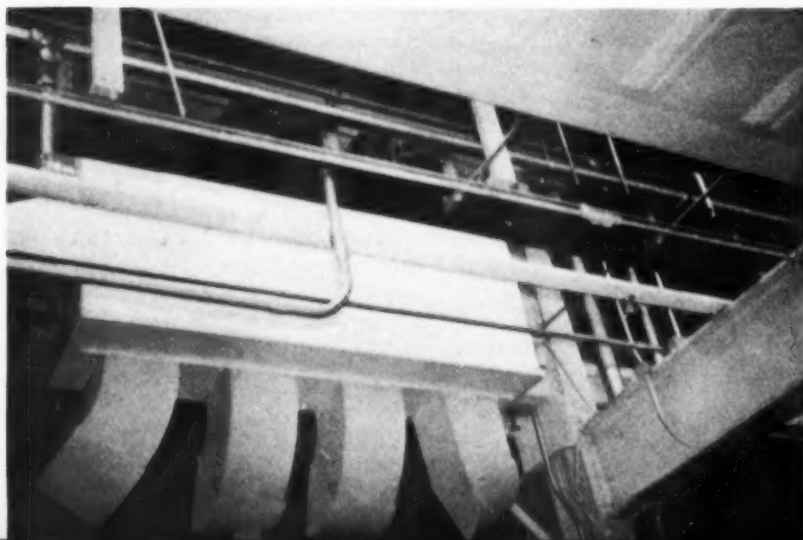


MESSENGER CABLES threaded through steel beams support lighting fixtures and conduits. Eliminates ceiling fixture suspensions and relieves conduit system of strain.



RUNNING-IN new equipment with a portable switch stand and heavy duty rubber covered leads. Motor control switches on the stand provide protection to the machine motors.

BUS BAR distribution system carries all power and lighting load. Motor and lighting circuits plug in. This type of distribution is especially adaptable to changes in plant layout.



in an enclosed 250-amp. bus bar distribution line running the length of the building near the center.

Plug-ins tap the bus bar at convenient points near motors and running-in receptacles. At two points there are taps for the lighting system. A short run of flexible conduit extends from the bus distribution plug to an air-cooled, insulating transformer rated at 230-volt primary and 230/115-volt secondary, single phase.

Web-Mounted Troughs

The lighting feeder, three number 1 DBRC type R conductors, extends in 1½-in. conduit from the transformer to a junction box which encloses a neutral bus at the center column. The "hot" out-sides run down the column in a wiring trough to a panelboard. The same trough and junction box carries the outgoing branch circuits, all neutral conductors terminating at the junction box neutral bus.

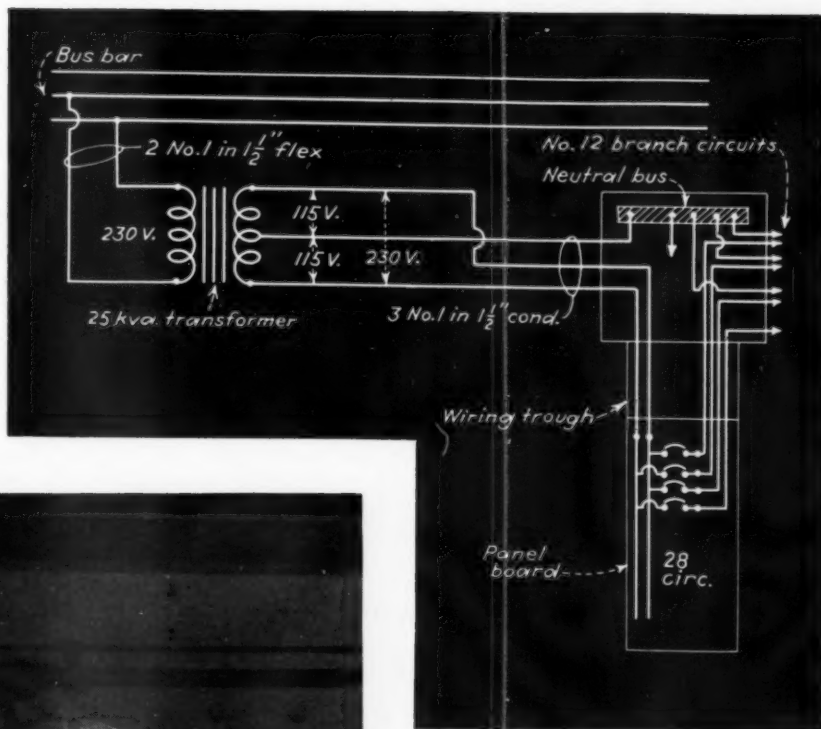
A particularly neat and space saving feature of the panelboard installation is the in-the-column mounting. The high junction box provides a terminal for branch circuit and feeder conduits, the wiring trough runs from this box to the panelboard below in the web of the column. The narrow, single row panelboard also fits compactly into the column presenting a thoroughly efficient, out-of-the-way and attractive installation.

In detail, the available space in the column web is 3⅞-in. deep and 13-in. wide, the panelboard and wiring gutter measures 5¼-in. deep and 12-in. wide, and contains 28 single pole circuits. The two lighting transformers, feeders and panelboard installations are identical and each serves one-half of the total lighting load.

Motor Test Stations

At running-in and test stations the power feeders extend from the bus system to disconnect switches, then to 3 pole, 3 phase plug receptacles in pairs. Temporary connections for test and running-in are provided by heavy duty flexible rubber cords to a switch stand, carrying the correctly rated motor starting switches. Heavy duty flexible rubber cords connect switches to the machine tool motors. The motor connections are made with test clips.

The lighting system consists of 92 Cooper Hewitt type, fluorescent units each rated at 100-watts, in six rows, spaced on 10-ft. centers both ways. The regular pattern is altered in the stock



TYPICAL wiring diagram of lighting transformer and panel board.

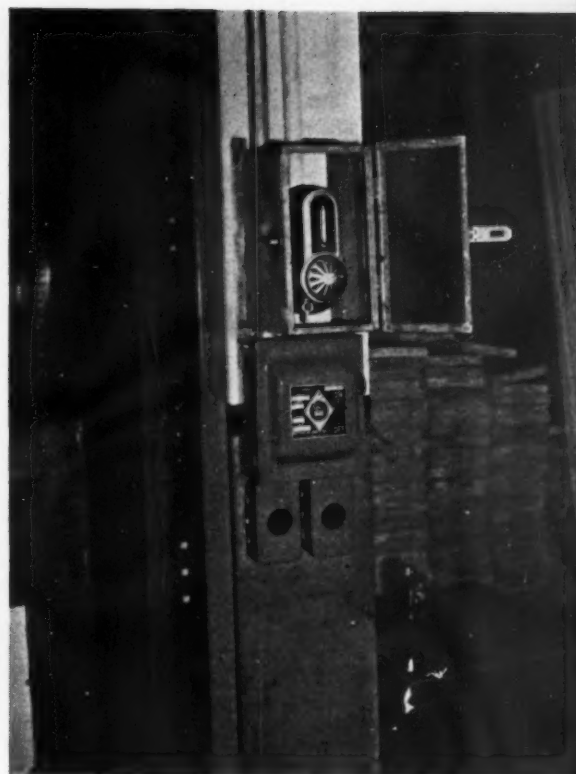
POWER RECEPTACLES for testing and running—in new machines are installed in pairs controlled by a disconnect switch. The mesh housing protects the thermostat from mechanical injury (above right).

room to conform with the shelving and in the crating department to conform with the material stock and machine line-up. The system produces an average of 30 to 35 foot-candles of general illumination.

The lighting units and the conduit system feeding them are suspended from $\frac{3}{8}$ -in. steel messenger wires stretched lengthwise of the building. The supporting wires are threaded through holes drilled in the beam, and securely anchored at each end with turn buckles to adjust the tension. This type of suspension eliminates drilling the steel frame (except for the small holes for the messenger) and supporting stems to the ceiling at the fixture fittings. It also relieves the conduit system from mechanical strain.

The conduit system consists of electrical metallic tubing and rigid galvanized conduit. Conductors are type R with No. 12 the minimum size used.

With an eye to the future, the general lighting system will be equally useful for any production operations with possible additions of local and supplementary lighting for the more intricate seeing tasks. The bus bar distribution system is immediately adaptable to any layout changes up to its full capacity.



LIGHTING TRANSFORMERS, air-cooled, are mounted on steel rails, fed from main distribution bus bar. Panels are installed in the web of the column. Circuits run through wiring trough up to a junction box which encloses a neutral bus and provides a conduit terminal.

STOCK ROOM is double decked. Bins are lighted by fluorescent units. Light spills through upper deck steel grating floor to shelves below.

FLUORESCENTS

in a Small Store

Fifth in a series of articles on the design, application and installation of fluorescent lighting. This article presents a case study of a fluorescent installation in a small sportswear store, and points the way toward the solution of similar problems in other modern shops.



GENERAL LIGHTING with daylight fluorescent units provides 63 foot-candles on the horizontal and 40 foot-candles on the vertical working planes in this store.

WHERE color contrast is important, some form of high intensity lighting, of daylight quality, is recommended. Today, fluorescent lighting is being used more and more for such applications, in both the industrial and commercial fields. One reason is the relatively high intensities available without unpleasant radiant heat.

Here is a typical small store, hemmed in on three sides by solid walls with only the front available for the entrance of whatever natural light there is in the crowded business section of a modern city. There were no skylights. Artificial light was the only method of illuminating the store.

Because of the cool, high intensity

illumination provided, fluorescent daylight lighting was installed. It accentuates the bright colors of the wearing apparel sold. And since there was no supplementary showcase lighting the type of unit chosen had to provide good vertical light distribution to illuminate the counters and display shelves. Some of them rise to a height of 7-ft. 4-in. above the floor.

Ten 200-watt fluorescent units were installed in the main sales area. They were of the open type without enclosing glass or louvers. These units, each contain four 40-watt daylight lamps, mounted in two rows of five units each, on 7-foot centers and 9-ft. 6-in. above the floor. They are fed by three circuits and arranged so that either three,

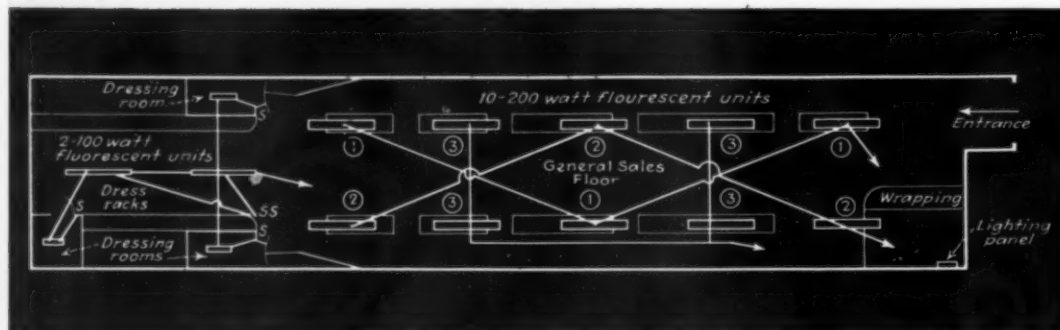
six or ten units can be operated from switches in the main panel at the front of the store. The walls above the shelves and paneling are covered with buff colored paper. The ceiling is constructed of off-white color sound-proofing board.

The dress racks, in the rear of the store are illuminated by two 100-watt units of the same type and mounted close to the hung ceiling which is 7-ft. 4-in. above the floor. Each unit contains two 40-watt daylight lamps and is controlled by separate switches mounted at the end of one of the racks. Three dressing rooms, located behind the racks, each have a 50-watt unit containing two 20-watt daylight lamps and controlled by individual switches.

Foot-candle readings taken after 150 hours of operation indicated intensities of 63 foot-candles on the tops of the counters, three feet above the floor. Vertical illumination on the shelves at five feet above the floor averaged 35 to 40 foot-candles.

Fluorescent lighting has solved the illumination problem of this small store and provided light which is pleasing to both owner and customers. Here was a typical lighting problem, faced by numerous small stores which have long narrow sales areas, and no windows or skylights to let in natural light.

CIRCUIT DIAGRAM showing the circuiting and location of the fluorescent units in this small wearing apparel store.



THE R. A. Reed Electric Co. of Los Angeles has developed a highly specialized motor repair business in the mining and oil well fields of California. They have done it by instituting a 24 hour emergency service and speeding up production right down the line through the use of a lot of time-saving ideas.

Starting from scratch seven years ago, the organization now numbers about thirty men working on three shifts. The shop can now rewind and deliver to the customer, within 16 hours from receipt at the shop, motors ranging from 1 to 30 hp. and two to twelve poles in size. Work on larger motors can be correspondingly speeded up. Motors of 200 hp. can be completed in 48 hours.

First of all, the shop is highly mechanized. Machinery for all operations is systematically arranged for straight line production. And it has plenty of good light for both day and night operation. The shop is divided into three departments—stripping, coil winding and assembly.

The stripping department is first in the production line and contains all equipment necessary to thoroughly strip and clean rotors, stators and other parts of the motor. Next in line, is the assembly department which is subdivided into the machine shop, dipping and baking, assembly and testing sections. The coil winding department is the last in line and includes the coil winding, spreading and taping machines, insulation cutting machines, undercutter and other equipment.

Rewind Procedure

All work done simultaneously in the stripping and coil departments converges on the assembly department where the motors are assembled, tested and prepared for delivery.

When a motor comes in all essential data is recorded on a loose leaf data sheet. Then a coil tag is made up giving the make, hp. and frame of the motor, the number of poles and number of turns, wire size, number of coils per group and number of groups. The coil dimensions, span and connections are also listed. This tag is sent to the winding department so the coil production can be started immediately.

In the meantime the rotor and stator are being stripped and cleaned in the stripping department. This includes cutting the stator coils with air tools, heating it at 350 degrees F., and stripping it. The stripped stator is then sand blasted and the burs filed down.



SHOP INTERIOR is flooded by plenty of light, both day and night, to speed up rewind operations. Skylights aid in distributing natural light.

Specializing in SPEEDY REPAIRS

This Los Angeles motor repair shop has organized to give 24 hour service for customers caught in a breakdown. It maintains a motor and parts exchange.

All rotors and bell heads are steam cleaned. This eliminates the use of strong erosive solutions and injurious acids in the cleaning process. The stripping and cleaning of motors from 1 to 30 hp. takes about 1½ hours.

The rotor and stator then move on to the assembly department where the coils are inserted. After rewinding the motor is tested and preheated at a temperature of 225 degrees F. to remove any moisture. It is then totally submerged in baking varnish for 30 minutes, then baked at 225 degrees F. for a period of six hours. This is followed by another dipping and an eight hour baking. After cleaning and while the motor is still hot three coats of quick-drying Glyptal are sprayed on the windings.

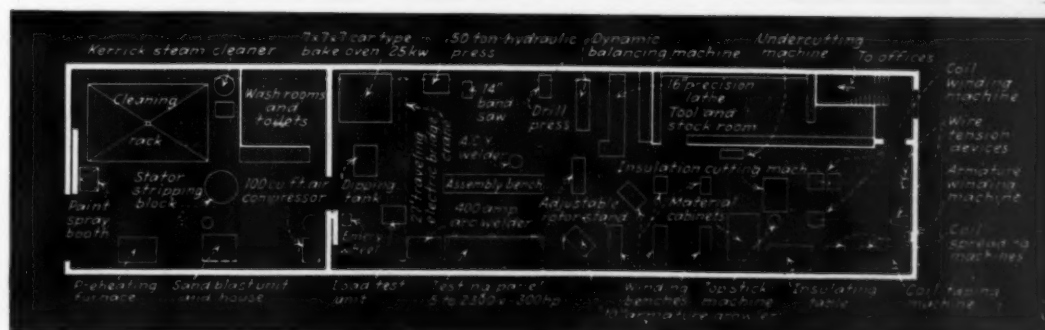
The bore of the motor is then

thoroughly cleaned, bearings installed and lubricated and assembly completed. The motor is then painted and is ready for delivery.

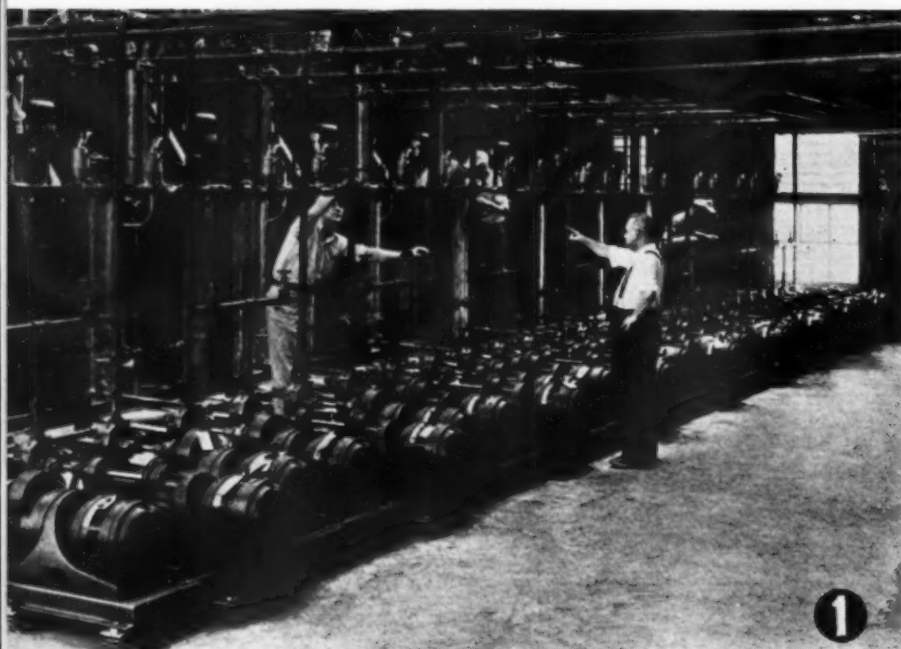
Motors filled with grime and dirt, but do not require rewinding, are steam cleaned, dipped and baked. They use a gas-fired flash boiler which can generate 175 pounds of steam in a few minutes.

The Reed organization maintains a stator exchange and a stock of rewound motors for immediate replacement for an even speedier service where stock motors can be used. For motors of odd or special design a complete stock of odd sizes of magnet wire is maintained. This service is especially important to industries where long shutdowns are not permissible and production schedules must be maintained.

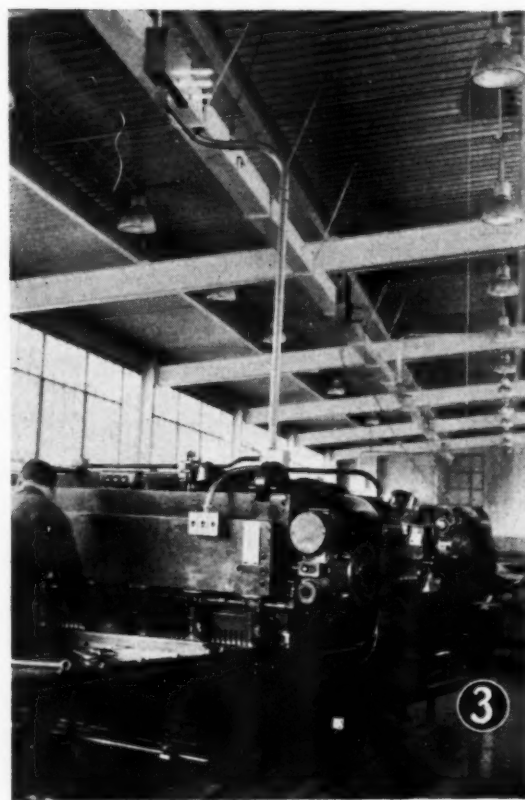
PLAN VIEW OF SHOP showing the departmental segregation, straight line production arrangement and the location of the important machines and equipment.



INSTALLATIONS of INGENUITY



Our industry's opportunity to serve in the present preparedness emergency is made plain by many recent applications of electric light, power and control, such as these. In each case a better way has been found to operate some industrial process. It has increased production, improved the product, reduced the costs or aided some problem of management. For in this situation, the manufacture of normal products is as much involved as new production for Government needs. And anything that facilitates normal operations, clears capacity for service to the nation's needs. Our function then is to seek out places for improved electrical equipment in every local industry, where they wait on every side.



1 COMPACT LAYOUT of thirty-six explosion proof motor driven rotary pumps in the new paint mixing room of the Packard Motor Car Co. Each 1½-inch pump is direct connected through a two-speed gear reducer to a 2 hp. motor, mounted to the concrete floor by special vibration springs to eliminate the transmission of vibration noises. A continuous copper ground bus, with jumpers to the motor frames, is bolted to each of the bases.

2 LEGGERS AND FOOTERS in the Phoenix Hosiery Co., Milwaukee are lighted by special totally enclosed prismatic glass units which give an asymmetric light pattern and concentrate the available light on the important parts of the machines. Six 300-watt units for each two machines, mounted on 7-ft. centers about 9 ft. above the floor, provide 35 to 40 foot-candles. This is one example of complicated machines adequately lighted by ceiling units.

3 SIGNAL LIGHTS (mounted overhead) speed up supervisory and service operations in the shearing department of the All-Steel Equip. Co., Aurora, Ill. System consists of three different colored tubular lamps above each machine and three tumble switches. The upper red light calls floor truck, center white light calls foreman and lower green light calls crane or steel handler. This signal system is effective in industries where noise affects bell and horn.



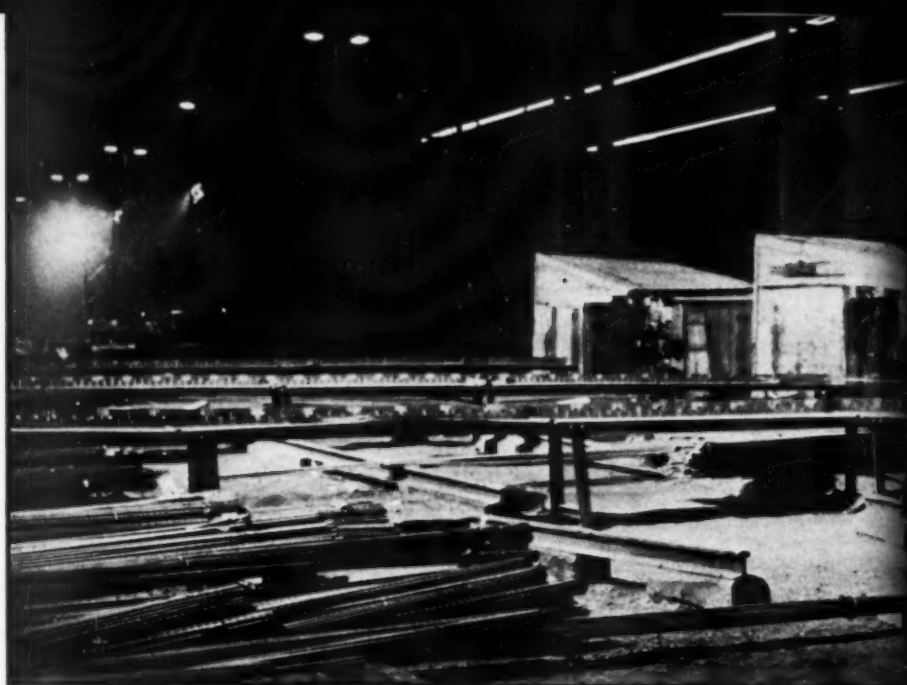
4 RECESSED FLUORESCENT units provide 40 foot-candles of cool illumination in this ice cream plant of H. P. Hood & Sons at Springfield, Mass. The trough, made in 8-ft. sections, is mounted end-to-end with each section containing one Tulamp ballast and a single row of two 40-watt white lamps. Fixture rows are spaced on 6-ft. centers. This type of lighting is finding its place in industrial plants where ceiling conditions permit its use.

5 BUILT-IN fluorescent lighting in a press at the All-Steel-Equip. Co., in Aurora, Ill. solved the difficult problem of lighting dies. In each of the two side columns of the press, 18 inch fluorescent daylight lamps were installed horizontally protected by a wire screen. The screen may be slid out of its sheet metal frame to allow access to the lamp for cleaning and replacement. This light source works well in hard to get at places.

6 INFRA-RED drying applied to radio speaker cone assembly. Glued parts are placed on a moving belt which carries them through a bank of 250-watt heat lamps in special reflectors. Drying time is controlled by the speed of the belt and concentration of infra-red radiation. Infra-red units can be used where quick, efficient, uniform drying and baking will speed up production schedules in manufacturing and service industries.

Private industry must protect itself from sabotage as it takes over production for preparedness. Light will play an important part. Here are the basic principles to consider in fence, area and emergency lighting.

By Glenn G. Bobst
*General Electric Company
Schenectady, N. Y.*



PROTECTIVE AREA lighting of the grounds of a large steel plant is provided by a number of wide beam floodlights, mounted so as to effectively cover the entire area.

PROTECTIVE Lighting . .

THE great influx of government orders for vital materials, together with the spreading world conflict, has made private industry acutely conscious that it must use every means available to protect itself from sabotage and espionage. The need for this protection increases daily especially now that the government has launched its national defense program.

There are many ways in which this protection is obtained. High barriers are constructed around plant areas, elaborate alarm systems are installed, adequate policing forces are maintained, and employees are kept on the alert for any signs which might indicate undercover work. A balanced combination of all of these methods usually gives the most adequate protection.

However, any combination loses its effectiveness after the fall of darkness if it is not supported by adequate lighting. Even the most vigilant police force will lose much of its efficiency during the hours of darkness if they are unable to observe the areas which they are to protect.

There are, in all, three basic types of lighting used for this service:

1. Fence lighting.
2. Area lighting.
3. Emergency lighting.



TYPICAL FLOODLIGHT projector with crossarm mounting and enclosing globe, used for lighting areas inside the fence line of industrial plants.

Which of these three types to use for best results depends on the particular conditions. In some cases one type of lighting will be most effective and in other cases another will apply. In many cases a combination of the three types will be necessary for protection.

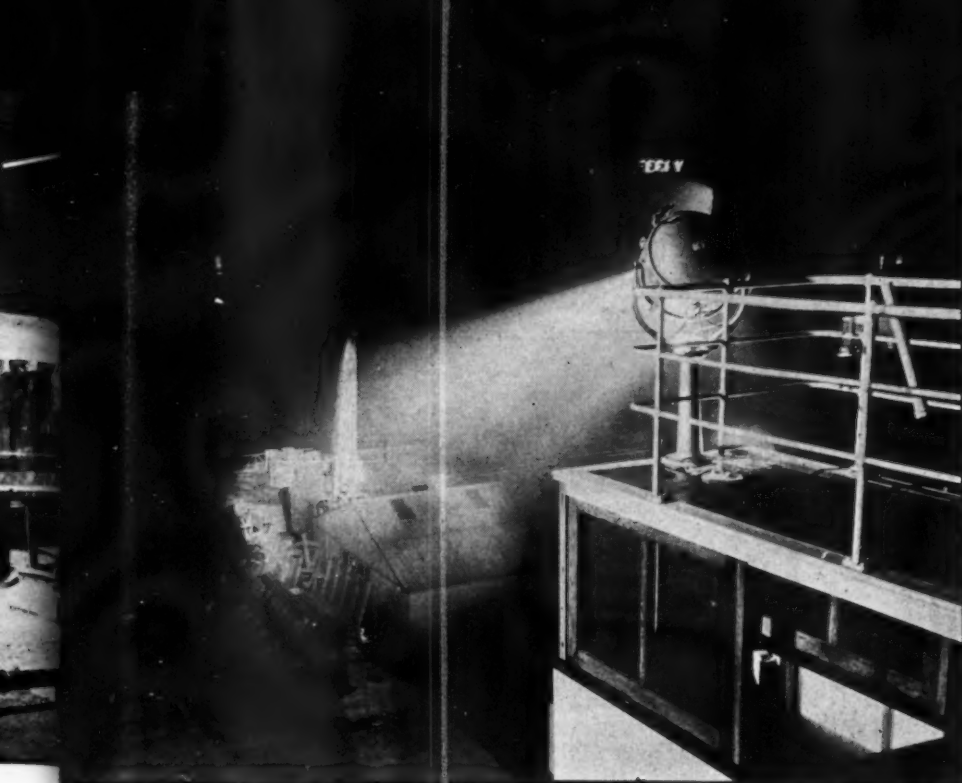
Fence lighting is used in large plants which have buildings spread out over a considerable area of land. It can be accomplished either through the use of pendant type street lights at proper spacings around the fence line or through the use of floodlights.

The method most commonly used employs pendant type street lights. The enclosed type of street lighting unit having a reflector top and a symmetric refractor bottom will give high efficiency and maximum utilization of available light. The refractor will redirect light rays, which would normally fall outside the area to be lighted, to the areas being lighted.

These units should be mounted on poles so that the light center of the luminaires will be approximately 25 feet from the ground and spaced not over 150/175 feet apart along the fence line. Many companies have been able to incorporate the poles right into the fence line to give a neat and strongly constructed installation. The units should be mounted on brackets 4 feet long extending inward from fence line.

Where possible, an excellent way of supplying power to these units is through a series circuit. A constant current transformer can be installed inside the plant in a convenient position and the circuit run underground around the entire plant fence line feeding each of the units in turn and returning to the transformer. This provides a single wire circuit which is very reliable and inexpensive to install and maintain.

A less expensive method of fence



EMERGENCY LIGHTING with narrow beam hand-controlled searchlights is employed in many plants. Beam can be quickly shifted from one spot to another.

A Reviving Market

lighting is by the use of floodlights. The general method of installation is the same as previously outlined for pendent units in that the poles, which should be 40 to 50 feet high, are located in the fence line. Two narrow beam 1000-1500 watt floodlights are mounted on the top of each pole, one to point each way down the fence line. This method has the advantage that it is only necessary to install one pole about every 400-500 feet. It has the disadvantage that owing to the height of the poles and the narrowness of the light beams, the resultant lighting is spotty and if one floodlight burns out the dark spot is much greater than if one light burns out in the pendant street lighting system. However, the floodlighting method is used in many places with very good results and in the proper place it is an excellent application.

Area lighting may be defined as the lighting of the grounds inside the fence line of a large plant or the lighting of the area surrounding an industrial plant consisting of one or two buildings. When the buildings within the plant area are sufficiently close together the area surrounding them can be lighted by floodlights mounted on these buildings. Wide beam floodlights should be used for this application. Experience

with this type of installation has indicated that the lighting should be on the order of .06 watts per square foot. If the total area in square feet to be lighted is multiplied by .06 the result will indicate the total number of watts which should be used to light that area. Whether these watts should be concentrated in one large floodlight or several small ones depends on the character of the area under consideration. Many different beam characters are available which can be combined to fit any size or shape area. As a rule a minimum of two floodlights should be used in order to eliminate cross shadows which would result if only one floodlight were used. The more cut up the area is with niches and corners, the greater should be the number of floodlights to avoid dark corners.

In large areas where the buildings are far apart, the recommended method is to mount a cluster of floodlights on a 60-70 foot pole in the middle of the area. The floodlights should be equally spaced around the circumference of the pole so that the total area is reasonably uniformly illuminated. The number of floodlights and their wattage is again determined by multiplying the total area by .06 watts per square foot to determine the total wattage and using a

sufficient number of floodlights to effectively cover the ground. This method of lighting simplifies the problem of supplying power and wiring the floodlights. When a bank of lights is connected to the same circuit they should be individually fused. A short circuit in one floodlight then will not take out the whole bank. This is extremely important since the loss of one floodlight will not materially effect the illumination but the loss of the whole bank might have dire results.

The third type—emergency lighting—is generally obtained by mounting a narrow beam searchlight on a roof top or on a guard house. The searchlight is connected to a shaft extending through the roof into the building and



CLOSE UP of street lighting unit used for fence lighting of industrial plant boundaries. Unit has fluted reflector and "spin-on" globe.

arranged so that the searchlight beam can be quickly shifted by a guard from one spot to another.

Protective lighting has been called a reviving market. It is really more than that because all plant operations are sharply aware that it is needed. It is not necessary to sell the idea of protective lighting to them. It is chiefly necessary to tell them how to do it and obtain effective results. The application of the basic principles described above to one or two jobs will soon familiarize a contractor sufficiently with this type of work that he can handle practically any problem which might arise.

Modern Safety Methods PAY DIVIDENDS

A Recommended FIRST AID KIT

INSTRUMENTS:

1 Pair Scissors . . . 3 inch Splinter Forceps
Tourniquet . . . Graduated Medicine Glass

DRUGS:

2 oz. or a minimum of 10 ampoules of aromatic spirits of ammonia . . . Boric acid—liquid, powder or tablet form to make 4% solution . . . 2 oz. or a minimum of 10 ampoules of tincture of iodine, half strength . . . 2 collapsible tubes, 3 oz., of burn dressing or at least 6 individual tubes . . . 2 oz. castor oil (for eye injuries).

DRESSINGS:

1 doz. sterile gauze bandages, assorted sizes, and one dozen assorted compresses in sealed packets . . . 1 five yard spool of 1-inch adhesive plaster . . . 3 packages, 1/2 oz. each, of absorbent cotton . . . Splints of assorted sizes for fractures, or wire splints . . . Wooden applicators wound with cotton . . . 1 doz. wooden tongue depressors.

All bottles or other containers of drugs or other substances should be clearly labeled and the specific purpose for which the contents are to be used should be marked thereon.

SAFETY or lack of safety in the electrical contracting industry substantially affects cost of operation. If you consider it of real importance you will do a good job to maintain it—if you do not you will have some key men laid up just when you need them most, delay your job and lose some of your profits out of unexpected increases in operating cost.

My only possible approach to the subject that would be of any aid to you would be on the basis that you consider safety on the job a matter of practical importance and one that affects in a substantial manner the final cost of operating the job. Then by the process of understanding your accident problems proceed to lay out a program or a series of objectives to overcome them.

Because your jobs vary as to size, independence and proximity to cooperative enterprises, it is impossible to set up any hard and fast rules, but from experience we can discuss certain items that recur regardless of the variances.

The typical accidents that records show are recurrent in the electrical contracting industry are:

1. *Back strains and hernias due to incorrect lifting.* Both may be easily avoided: (a) teach employees to lift slowly and correctly; (b) have enough men to lift each load or else lift it only with hoists or other equipment.

2. *Injury from falls.* These may be from stagings, ladders, tripping over

material, or due to tools that slip. Remember that falls are by far the most frequent cause of accidents.

(a) Stagings should be solidly planked and kept free from all but absolutely necessary materials. There is no excuse for using a cluttered-up staging or one from which planking has been "swiped."

(b) Ladders should be high enough so that one never need stand on the top step or rung, and no rickety or broken ladders should be tolerated. Be sure they are set on a solid and reasonably level surface. When used in dangerous locations, take the time to tie the ladders in place,—you may prevent a fatal injury.

(c) The answer to the tripping hazard is simply good housekeeping. There is no excuse for working in a mess of materials and projecting nails and dirt.

(d) Falls due to hand tools are usually caused by worn jaws of wrenches and pliers, by improper tools as to size or as to use, which do not hold when the pull is exerted. This can be corrected only by replacing with tools designed for the particular job and tools that are kept in good physical condition.

3. *Minor cuts, bruises and skinned knuckles.* These are going to happen because of the very nature of the work you are doing but if properly handled will amount to little. By proper handling I mean good first-aid application



By W. H. Seymour

Vice President and Manager
Loss Prevention Department
Liberty Mutual Insurance Company

which can and should be insisted on to eliminate the possibility of infection. Follow-through should be by a progress check-up during the next few days so that a man could be sent to a physician if the injury is not healing properly.

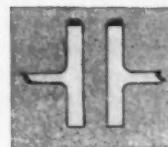
What you should have in your first-aid kit, I would say, depends upon your proximity to other medical help and the opinion of your own local doctors. I say this because medical authorities sometimes disagree as to complete contents of a kit and the kind of medication used. Therefore, to give you a satisfactory list and still stay within the bounds as a layman, I suggest that the list published in the Industrial Safety Standards, which is used as a guide by most casualty insurance companies, might be a good one for you to use as

[Continued on page 47]



ARE FACTORIES CLEANER THAN HOMES?

The amount of dust and grime that settles on the floor of your own home should answer once-and-for-all the kind of Motor Control you should buy for your factory. Do you think there is any less dust and dirt in and on your Motor Control than there is in your home? Of course not. And you know what that dust does if it piles up on your Motor Control contacts. So you, too, will insist on *vertical contact* Motor Control, Cutler-Hammer Motor Control in which the *vertical* contacts by their very design can't collect dirt, must stay clean, must work better, must last longer. Standardize on Cutler-Hammer and see the difference in performance and maintenance costs. CUTLER-HAMMER, Inc., Pioneer Electrical Manufacturers, 1306 St. Paul Avenue, Milwaukee, Wis.



The problem of dirty contacts . . . solved so simply it's almost funny. And yet Cutler-Hammer is the ONE Motor Control that uses vertical contacts exclusively.



Insist on

Dust Safe VERTICAL Contacts

Editorials

Earl Whitehorne, Editor

NECA Protests

Unceasing vigilance is still vital in this world. Electrical contractors have responded to the national campaign for preparedness, ready and eager to do their part. But in setting up a cost-plus-fixed-fee basis for Army and Navy construction, the government unwittingly tempts the general contractor to do his own electrical work, despite excessive costs. In order to enjoy all the fixed-fee, he is by-passing the electrical contractor, the plumber, the heating and air-conditioning contractors and setting up his own staff to do this work.

All electrical contractors will be grateful to NECA for quickly challenging this trend. A bold, straightforward statement has been submitted to the Department of Commerce with the understanding that it will be laid before the President with a recommended executive order.

Unless the government is to sacrifice the economies which the highly specialized contractor offers, prompt action should follow. Meanwhile, however, it will do no harm to enlist the assistance of your Congressmen and Senators. For the public interest here is clear.

Inspectors More Important Than Ever

The new Code places a greater burden than ever before on the shoulders of the electrical inspector. He finds himself faced with the necessity of approving or disapproving various new materials. He has to get a firm hold on new methods of computation of carrying capacities, etc.

Since he has final authority in the

communities directly in his charge, he is now called on to exercise sound engineering judgment and, in many cases, he probably will have to settle numerous arguments. In a very real sense, he is the guardian of the future health of the whole electrical industry. His job under these new conditions is not an enviable one but from the date that the new Code goes into effect, he becomes a more important factor than ever before in the electrical industry.

Welcome Change

Business rolls forward on the wheels of change. When we think we know everything about our business, interest in it dwindles and opportunity languishes. That's why the fluorescent lamp has created so much enthusiasm in the electrical industry. It is not only something new in illumination. It is something new to learn about. It is something important to add to the service that we render. And it has that priceless quality of offering an improvement that pays for itself in the economy it offers.

There are some contractors who have looked upon the fluorescent lamp as just another kind of incandescent light. They felt they knew the whole lighting story, so the fluorescent development has not meant much to them. But every electrical contractor should make an intensive study of the characteristics and possibilities of this new illuminant. He should welcome it as a gracious gift that brings new change in our work and in the possibilities of our service.

With this attitude and this preparation, the whole field of lighting is reopened. For here is something that

offers tangible benefit in a whole variety of applications obtainable by your customer at no more than present costs.

Old Buildings First

The War Department believes it spent too much on brick and mortar during the World War. They financed countless new buildings needed to produce munitions. This time they plan it otherwise. They will encourage and assist the use of old buildings first. For it will take less time to put them into production.

It looks as though small building wire had come along about in time. But do the manufacturers of your town realize this and what the government will do to help them get their plants ready? An electrical contractor can tell 'em!

Tool Charges

Hard bitten accounts are apt to protest charges for tool rental on time and material billing. Once the contractors give in, every subsequent job gets the same protest. The Chicago Electrical Contractors Association is now going to do something about it.

Under the direction of Walter Collins a chart is being prepared showing what each tool saves in labor charges and a comparison between the tool charge and what the labor charge would be if the tool were not used.

This is the kind of argument that talks a language that is understood. Once they understand what tool charges mean their present attitude will likely be reversed. Rather than protest tool charges they will look with suspicion upon any T & M billing that does not include items for tool rental.

Inspection Brings Sales

Speaking of selling—a certain New England contractor has a smart idea. He makes it a condition in each commercial and industrial contract he signs that he will re-inspect the job every six months. The call back, therefore, becomes an obligation which he has assumed in the interest of the customer.

Naturally in most cases he finds nothing wrong. But in many cases additional work is indicated. If he finds that the machinery has been moved around and other changes have taken place, he suggests additional outlets, better control, or something else. And while he is there he has the chance to talk air conditioning, improved illumination. Much good business comes out of it. And it is something that any contractor can do.

Be Not Afraid

According to our old friend Sam Hibben, sage of Westinghouse Lamp, on the date that this is written, the sun has risen and set some 3,695,742,654,130,011,162 times without our having done much about it. It goes right along in its regular way. And now that Joshua is dead, we doubt whether there is any use trying to change the system.

War may ravish the nation. Democracy may totter in Europe. Freedom in America may even be threatened. And yet the robins fly north in the spring and lay four blue eggs in a new nest. The flowers bloom. And the morning and the evening make another day. What we are saying is that life goes on. So does the function of the electrical contractor.

There is only one new problem that we face. That is how to adjust our operations to the changing needs brought on by these new conditions in the world. And if we realize our responsibilities to our times, we will not lack opportunity.

Man Hour Knowledge

Beyond question the most important thing for an electrical contractor to know is how long it will take a man to do a piece of work. Every estimate is based on that foundation. The cost of every job is checked against that knowledge. And the more he can know about the man hour experience of other contractors, the safer he is in his judgment and his operation.

How long should it take a man to set a distribution panel or a main service or to fabricate conduit hangers of a size? This is vital knowledge that each man should possess and eagerly share with his competitors.

The greatest menace to fair competition is ignorance on the part of some contractor who does not realize the work involved in the operations that the prospective job will involve. So important is it that in every community there might well be a bureau for the exchange of man hour data among the local contractors. And it would jeopardize nobody's profit because it is in the design of the installation, the management of the job and the use of the data to effect economies that counts. The more you can do to educate your competitor to include every operation in his estimate and to be accurate in his man hour judgment, the better you are.

Sales Courage

For those who are always complaining that electrical contractors are poor salesmen, hark to the following. A store manager called in an electrical contractor in the Middlewest and asked him to lay out a fluorescent lighting job. "I have \$1500 budgeted for this job and you will have to stay under that," he warned.

The contractor went over the store, checked the wiring system and came back with the layout, for only two out of four departments.

He explained, "I can give you fluorescent lighting throughout within your price of \$1500, but after the novelty wears off, you will be disappointed, because you won't get the light you need.

"Within that budget I can give you a real lighting job with fluorescent lighting in two departments. Now here is the idea—"

The sequel, of course, was that the whole establishment was lighted for nearly double the amount originally budgeted.

Try It Yourself

Of course, anything new involving strange calculations and the trial of new materials not stocked by a lot of contractors is slow in starting. But now experience is coming through and as we read descriptions of this installation and that, where the new wire has been used, it becomes more obvious that the new idea is sound and the new material practical.

It remains now for everyone inter-

ested in the modernizing of wiring systems to step out and make this experiment for himself. For there are departments in every factory where the plant staff might well make improvements. There are buildings in every city in crying need of relief, a relief that is readily salable by any contractor who will go and tell the story to the management. Before this year is over, every electrical contractor should develop some experience in the use of this new wire.

Good Will Applied

Here's an interesting story that comes from San Francisco.

The Trumbull Electric Mfg. Co. is to occupy a new building. Nine electrical contractors were invited to lunch with the manager and the sales staff of Trumbull. At its conclusion, eight gold pencils and a gold pen were passed around in identical boxes and the contractor who received the pen, by chance, was automatically selected to do the wiring job on a time and material basis.

Here's an act of practical good will and cooperation within the local electrical family that deserves high praise. Too often when we are buyers, the zeal to drive a bargain blinds us to the opportunity offered to build goodwill and make a practical contribution to local cooperation. Congratulations to Trumbull and to Howard Stolper of Burbank who received the pen—and the job.

Combination Lighting

For some time after the introduction of fluorescent lighting there were conflicting claims over the relative merits of fluorescent and incandescent lighting installations. With more experience and fewer emotional outbursts the lighting industry is at last settling down to first principles again.

There are a number of exceptionally fine jobs going in around the country employing a combination of fluorescent and incandescent lighting equipment with complete harmony. This is an entirely natural development and with continued intelligent engineering and application fluorescent lighting will probably have a broader development by this technique than if it were promoted as a cure-all substitute for incandescent lighting.

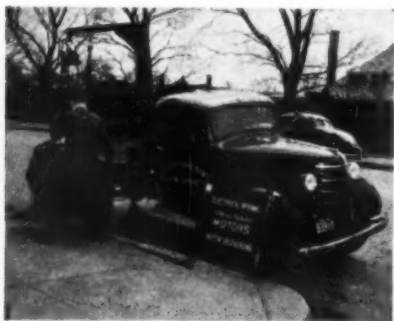
WIRING

Methods

TRUCK HOIST

J. J. Reddington of the J. J. Reddington Electric Service Co., Boston, Mass., has designed and built a cantilever type hoist on his truck that will enable one man to load and unload a motor up to 100 hp. in size or up to 2000 pounds in weight. The only requirements necessary for the one-man job, is that the truck be able to get alongside of the motor.

Here's how it works. The driver pulls the truck alongside of the motor, places a jack under the right side of the truck platform, about 18 inches back from the front edge, and raises the platform until there is a slight inward tilt. This facilitates swinging the hoist arm inward to set the motor on the



ONE MAN LOADING a 100 hp., 900 rpm motor on the truck for delivery to a customer. Hoist arm clears truck body sufficiently so man can hoist and guide motor simultaneously.

truck. When unloading the jack is lowered slightly to allow the hoist arm to swing outward.

A one-ton chain hoist hooked to the hoist arm is used to raise and lower the motor.

The hoist equipment consists of a three foot arm of 3-inch I-beam welded to a 7 foot length of 2½-inch Shelby tubing and braced with a triangular piece of ¼-in. steel boiler plate welded to the beam and tubing. This unit telescopes into a four foot length of 3-inch, heavy wall, high pressure steam pipe, which in turn is welded to the upper face of a 6-inch I-beam flange. The I-beam lays across the truck

chassis between the body and the cab and is bolted to the chassis beams with U-bolts. The 6-inch supporting pipe is mounted directly over the right hand chassis beam and supported by two angle braces, one welded to the I-beam and the other fastened to the chassis beam.

The hoist is adjustable for larger clearances. It can be raised 14 inches by inserting a 1-in. steel pin into holes drilled through the 6-in. steam pipe. The pin is chained to the pipe to prevent its loss.

The hoist is also used for contracting work, especially for street lighting jobs. A 24-foot section of 2½-in. pipe with a similar 3-foot arm and a block and fall, is used to set street lighting poles.

The advantages of this piece of equipment are obvious. It saves considerable time and labor. One man can load a 50 hp. 1800 rpm motor, alone, in 20 minutes. It eliminates the necessity of carrying a mass of ropes, skids, rollers and cribbing whenever a large motor job comes along. Since the hoist is always on the truck it can go direct to the pick-up without first returning to the shop.

BUS WORK IN CLOSE QUARTERS

In changing over the electrical system of a large commercial building from 25 cycle to 60 cycle operation the Sterns Electric Equipment Co., of Buffalo, N. Y., had to connect an existing switchboard to the new multi-cable 60 cycle feeder. The feeder for the new three phase, four-wire system consisted of five 500,000 CM lead covered cables per phase leg with one No. 4/0 neutral for each group of cables.

The cables were terminated at buses mounted on the floor directly behind the switchboard. They could not be mounted on the wall because of the clearance necessary for a man to work behind the board and due to the large number of feeder cables, overhead mounting could not be used. The bus

work consisted of four ¼- by 4-inch copper buses per phase, mounted to the concrete floor by insulated bus supports. The feeder cables came up from the underground trench directly under the buses and were connected to them with solderless lugs. From these floor buses jumper cables were installed to feed

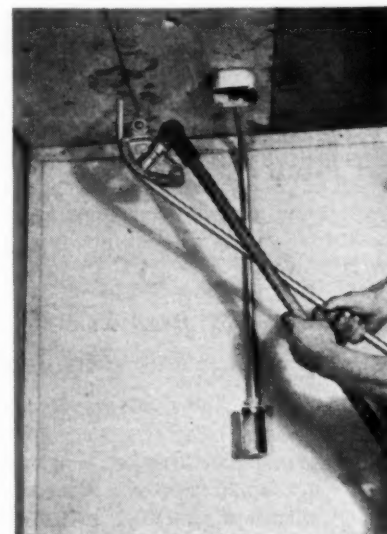


FLOOR MOUNTED buses were used to facilitate connections from new underground multi-cable feeder to an existing switchboard. All live parts were carefully insulated with linen tape.

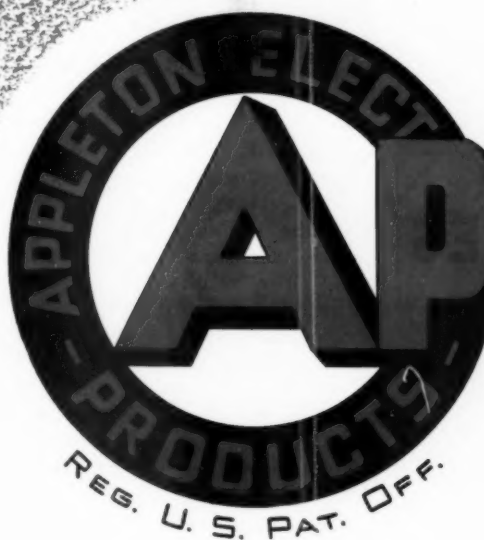
the main buses on the existing panel. All live parts on the floor buses were carefully wrapped with linen tape to prevent anyone from coming in contact with them.

BENDING STEEL TUBES

H. W. Fraser and J. A. Morris of the Fraser-Morris Electric Company, Minneapolis had experienced considerable trouble from time to time on oil

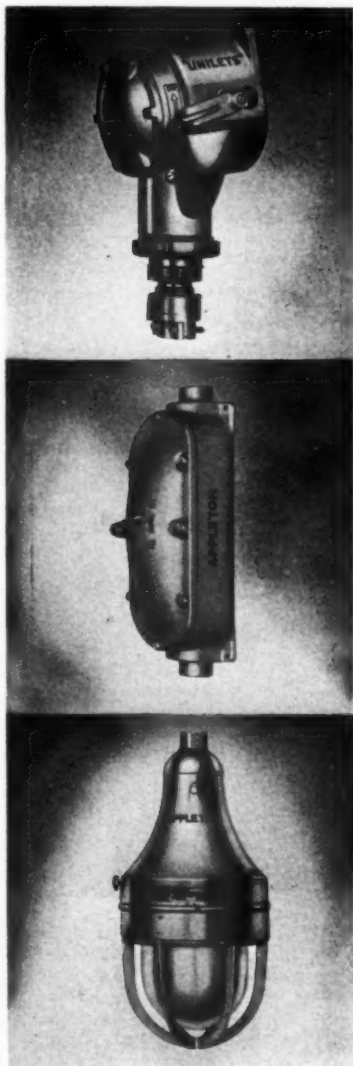


ADJUSTABLE HANDLE on steel tube bender facilitates getting into awkward places and making all types of bends and offsets.



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This process multiplies manyfold the number of HAZARDOUS LOCATIONS where

APPLETON EXPLOSION PROOF FITTINGS

are the complete answer.

A complete line of SEAL-LINE UNILETS, SWITCH UNILETS, LIGHTING FIXTURES, and complete factory stocks have put the APPLETON distributor in the spotlight as headquarters for EXPLOSION PROOF FITTINGS, and he can give you quick service.

Write for catalogs with complete details and the name of your nearest Appleton Distributor.



Conduit Fittings • Outlet and Switch Boxes • Explosion Proof Fittings • Reelites

THE NEW WHEELER "DAY-LUX" FLUORESCENT LUMINAIRES FOR LIGHTING

**Offices, Stores, Hotels,
Clubs, Restaurants,
Theatres, Public Buildings, etc.**

Here is a new line of distinctive, beautifully designed Fluorescent luminaires made especially for general illumination purposes in commercial locations.

These fixtures furnish an abundant quantity of the soft, cool daylight illumination which makes seeing easy and working conditions ideal.

"DAY-LUX" Luminaires, which utilize 40-watt lamps, are available in two- or four-lamp construction.

All fixtures are supplied complete with white lamp holders, high power factor Tulamp ballast equipment, and removable and renewable separate starter switches located on the top of the units.

Reflectors are constructed of white enameled steel. Decorative end caps and canopy finished a beautiful crackled aluminum.

As illustrated, fixtures can be supplied with panels of frosted glass, or without glass.

All units are furnished with ballasts for 110-125 volts, 60 cycle A.C. operation.

Length of stems: 24" standard.

FOR MOUNTING CLOSE TO THE SURFACE

If desired for surface mounting, fixtures will be furnished with 6" stems.

For complete data write for New Bulletin No. 65

Distributed Exclusively Through Electrical Wholesalers

WHEELER REFLECTOR COMPANY

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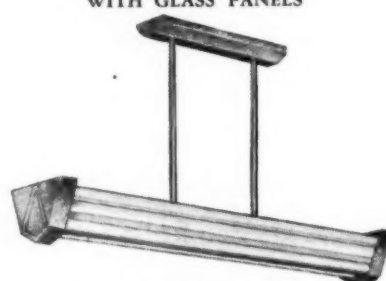
NEW YORK

ATLANTA

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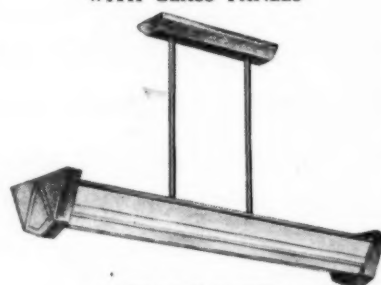
FOUR LIGHT UNIT
WITH GLASS PANELS



FOUR LIGHT UNIT
WITHOUT GLASS PANELS



TWO LIGHT UNIT
WITH GLASS PANELS



TWO LIGHT UNIT
WITHOUT GLASS PANELS

**WIRING
Methods**

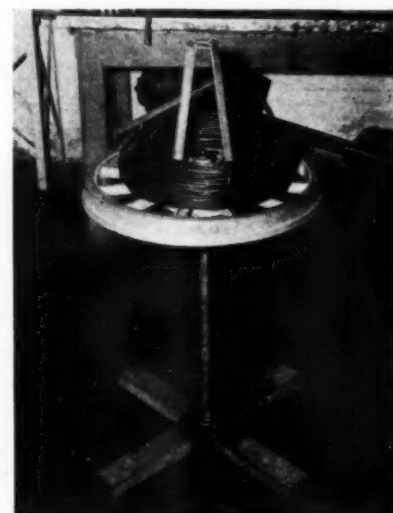
[FROM PAGE 22]

burner work, especially with pipe stubs coming through the floor. It was difficult to get at them and to bend them with the ordinary steel tube bender. So they set about making one of their own. The result—a bender with an adjustable lever arm which allows pipe bending from any angle. The new gadget called a "Dohickey", consists of an ordinary steel tube bender with the added feature of a locking type swivel joint at the base of the lever arm, which permits a number of adjustments within a 180 degree arc. Tightening a wing nut locks the arm in the position desired.

PAYOUT WHEEL

A discarded automobile wheel is utilized by Herbert J. Martin & Son, Albany, N. Y., to construct a payout reel for shop use in making up measured lengths of wire.

The wheel is 23 inches in diameter and is supported by its original axle and bearings, which provide free rotation. The axle is welded to the center of two 3-inch channel iron cross pieces which form the base of the stand.



PAYOUT WHEEL constructed from a discarded automobile wheel facilitates unwinding coiled wire. It is used in conjunction with a wire meter in making up measured lengths in the shop.

The coil retaining cone on top of the wheel is made of four pieces of 1-in. by 1/4-in. flat iron bolted to the spokes of the wheel and to a large flat iron washer at the top. It extends 12-inches above the wheel and tapers from the washer down to the spokes. This payout reel will take all standard coils of wire.


Electrical Contracting, August 1940

From Building Wires to



WEATHERPROOF



**OVER 60 TYPES OF
ROEBLING  ELECTRICAL
WIRES AND CABLES**

Rubber Covered Building Wires and
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Service Entrance Cables

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And a wide variety of other wires and
cables, either Standard or to Customer's Specifications

QUICK SHIPMENT

Prompt Service is available at all offices and
warehouse points listed below, where large
stocks of a wide variety of standard Roebling
Wires and Cables are always on hand. Your
request for information, prices or samples will
be welcomed.

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IF IT'S ELECTRICAL WIRE OR CABLE

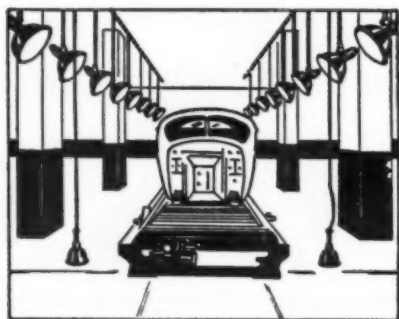
ROEBLING

HAS IT!

Better Lighting

SPECIAL PURPOSE PROJECTORS

Enclosed industrial projectors employing mercury or incandescent lamps find many applications in specialized lighting for numerous seeing tasks encountered in industry such as finishing and inspection. The application illustrated, shows the use of projector units



with fluted cover glasses to spread a high level band of light on the vertical surfaces of an auto body. With 300-watt units, equipped with spread lens and spaced 5 feet apart, the illumination on the working surface is of the order of 100 footcandles. A single 200-watt unit, without a spread lens will provide about 200 footcandles over an area of 7 to 8 square feet at a distance of 5 feet.

DAYLIGHT MUST BE SUPPLEMENTED

Casual thought may lead to the conclusion that daylight is all sufficient and need not be supplemented by artificial lighting to provide good seeing conditions. The fallacy of this conclusion is apparent when footcandle measurements are made. On a bright, sunshiny day in midsummer, the amount of daylight available at the window is in the neighborhood of 100 footcandles. But at a distance of 20 feet from the window the illumination has dropped to the eye-strain level of 3 footcandles.

Daylight also varies tremendously from day to day and from hour to hour.

Weather Bureau records over a twenty-nine-year period show that in Cleveland, a fairly typical city, there were 6 hours of sunshine, 6 hours of cloudiness and 12 hours of darkness in the average 24-hour period. During the winter months when production schedules are generally heaviest, the hours of sunshine decreased to an average of two per day.

DOWNLIGHTING WITH FLUORESCENT

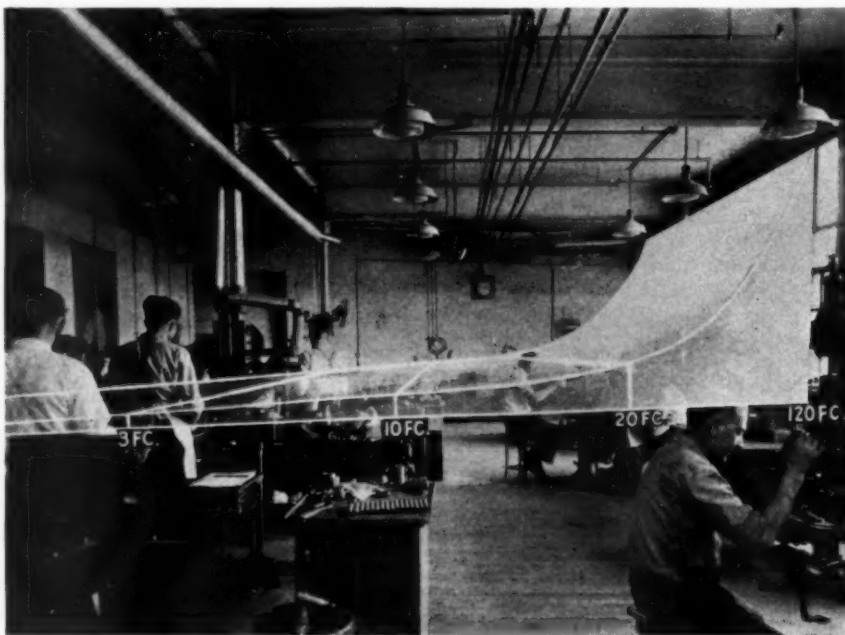
Adequate lighting speeds sales because it makes it possible to appraise merchandise accurately, to see color, texture and workmanship. Such lighting is provided in this store of Cleveland's Standard Drug group by a combination of direct and indirect lighting. The base or general lighting is provided by five indirect fixtures which give the ceiling a reasonably uniform brightness and provide 15 foot-candles throughout the traffic area. Merchandise on counters and walls is highlighted to 65 and 30 foot-candles respectively, by two rows of 40-watt white fluorescent lamps in asymmetric trough reflectors of specular aluminum extending almost the entire length of the store.



COMBINATION LIGHTING with incandescent indirect units and fluorescent downlighting over the merchandise counters, provides pleasant and effective high intensity illumination in this Cleveland drug store.

LITHOGRAPHING PRESS LIGHTING

The Strobridge Lithographing Company, located in the small town of Norwood, Ohio, has provided its employees with a lighting system commensurate with the seeing tasks performed. There are 15 to 25 foot-candles of general lighting provided by two 300-watt



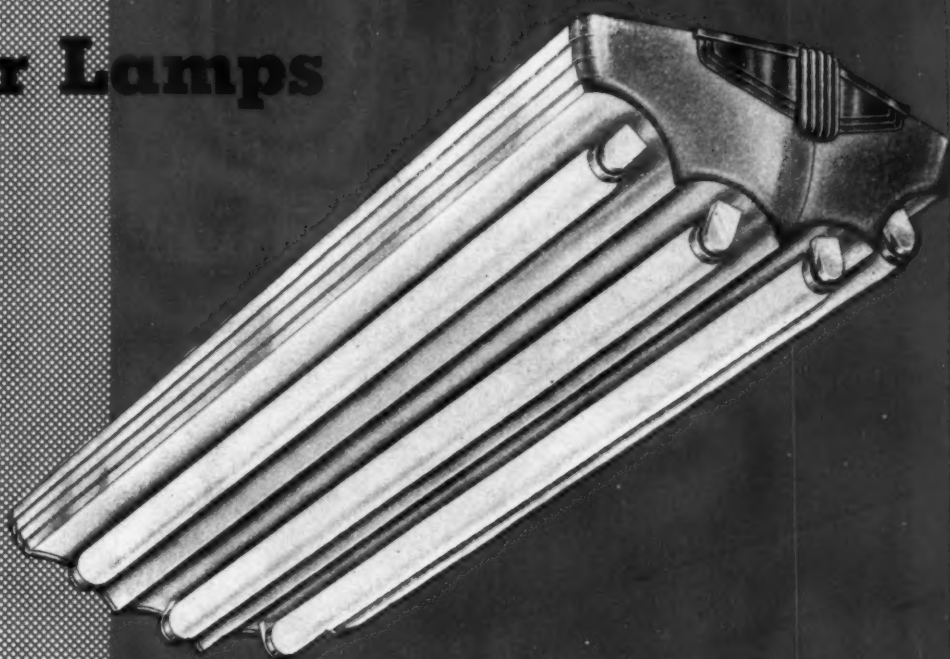
SUPPLEMENTARY ARTIFICIAL lighting is necessary to blend with the natural light even on bright sunshiny days. A natural light intensity curve is shown above.

THE NEW PARALUME

T. M. Reg. U. S. Pat. Off.

Design Pats. Applied for

For Four Lamps



For 24" and 48" Fluorescent Lamps

Now
Available

.... a complete range of sizes for all
Commercial Applications



HANGERS ARE
AVAILABLE
FOR
SUSPENSION

THE TWO-LIGHT
PARALUME

THE THREE-LIGHT
PARALUME

The addition of the four light **PARALUME** to Day-Brite's outstanding line of fluorescent fixtures brings to you a complete selection of units for every application. Wide-spread distribution . . . smart and stylish . . . rigidly constructed and high in efficiency. These fixtures bring you the utmost in fluorescent lighting.

Available in satin chromium and in "DAY-BRITE SUPER-WHITE" finishes for two, three and four 24" and 48" lamps. For direct and suspension mounting.

Your copy of Bulletin F-22 is available now. Write today and we will send you this complete new listing. **Day-Brite Lighting, Incorporated, 5435 Bulwer Avenue, St. Louis, Missouri.**

It is to your advantage to sell only well-known, high quality, correctly engineered lighting equipment. It will pay you big dividends in the long run by assuring satisfied customers for repeat business. For fluorescent lighting at its best . . . insist upon **DAY-BRITE**.

Sold Through Your Electrical Wholesaler

DayBrite
LIGHTING, INC. ST. LOUIS, MISSOURI

GREATER CAPACITY OF WIRING

with G-E HIGH-power-factor fluorescent installations



G-E Tulamp high-power-factor ballast

G-E single-lamp high-power-factor ballast

G-E capacitor (for improving power-factor of existing installations)

YOU can put more fixtures on the same wiring when you make your fluorescent installations the G-E high-power-factor way. Fixtures equipped with the new G-E single-lamp high-power-factor ballasts or G-E Tulamp ballasts operate at power-factors above 90 per cent. They provide extra system capacity and lower power losses, and they comply with all power-factor code regulations.

Moreover, the inherent dependability and longevity of these G-E ballasts are assurance of satisfactory service and satisfied customers—and the G-E monogram makes the installation easy to sell. All ballasts are listed by the Underwriters' Laboratories—all Tulamp units are certified by the Electrical Testing Laboratories. Best of all, the benefits of high-power-factor cost surprisingly little. For example, some Tulamp-ballast-equipped fixtures cost only two per cent more than normal-power-factor equipments.

Specify G-E high-power-factor ballasts in the fixtures you buy—they pay worthwhile dividends. General Electric, Schenectady, New York.

Described in Bulletin GEA-3293

GENERAL ELECTRIC



[FROM PAGE 26]

Glassteel Diffusers per bay. The supplementary lighting of the press is accomplished by one 300-watt Glassteel Diffuser and one 200-watt wide angle reflector, with the latter located on a swivel out of the way when working



SUPPLEMENTARY UNITS consisting of glassteel diffusers, wide angle reflectors and intensifier units are combined with the general lighting to provide high intensity illumination on these lithographing presses.

at the feed end of the press bed. Two Intensifier units with 200-watt daylight lamps are located at the delivery end. The inspection table has 30 to 50 foot-candles provided by 300-watt Glassteel Trutint units mounted 7-feet above the floor.



EIGHTY FOOT-CANDLES — The Heating and Conditioning Division of the Norge Corporation, Detroit, is lighted to a level of 80 foot-candles. The installation consists of 400 watt Type H mercury lamps and 750 watt filament lamps alternately spaced on 7½- by 10-ft. centers. Goodrich porcelain enameled units are used and these are mounted 9-feet high. Trolley duct is used for flexibility. Intensity can be raised to a maximum of 250 foot-candles. (This picture appeared in our June issue but through an error it stated that Ivanhoe rather than Goodrich units were used.)

Eyes spend more time *Seeing* when the lighting is good



Good lighting calls for

ALZAK FRED. T. M., ALUMINUM COMPANY OF AMERICA **ALUMINUM REFLECTORS**



Eyes do less looking for things to see when the lighting is good. Their owners get things done better and faster, and find tasks more agreeable. Accidents are fewer.

Alzak Aluminum Reflectors help you get *good* lighting. Their high reflectivity, obtained by a special electrolytic treatment of Aluminum sheet, assures maximum over-all efficiency. Their long life and ease of maintenance make annual costs low. The smooth, oxide surface of glass-like hardness will not chip, doesn't scratch easily and can be readily cleaned with soap and water.

Alzak Reflectors include a series of finishes; bright, specular finishes or matte, diffuse surfaces. Some are intended for indoor use. Others are able to withstand out-of-door exposure and the corrosive conditions encountered in certain industrial processes. Whatever your use, be sure to *specify the right Alzak finish.*

We do not manufacture reflectors. Names of those companies licensed under Aluminum Company of America patents, and able to take care of your requirements, will be furnished by us on request.

You can identify a genuine Alzak Reflector by a label affixed to it by the manufacturer. This lists the patents protecting the processes that assure uniform, high quality workmanship. Look for that label when you are buying reflectors.

ALUMINUM COMPANY OF AMERICA
1946 GULF BUILDING • PITTSBURGH, PA.

Motor Shops

ARMATURE WINDING HEAD

To facilitate winding small armatures, George Williams of the Superior Electric Service Co., Springfield, Mass., has designed and built an armature winding head.

The apparatus consists of a removable cross arm which can slide up and down in a collar keyed to the shaft, permitting the armature body to be centered. A set screw holds this arm in place. Adjustable set screw bracket arms on the cross arm hold the armature rigidly and take any shaft length up to 20 inches and any standard armature up to 2 hp. in size. The mechanism is belt and gear driven by a foot



ADJUSTABLE HEAD simplifies small armature winding problems. Takes standard armatures up to 2 hp. in size.

pedal operated sewing machine motor with a built-in friction clutch and brake. The winding head speed is 80 rpm. A counter attached to the head shaft indicates the number of turns applied.

METAL SPRAYING

A new metal spray gun has been added to the facilities of the motor repair shop of Berger Brothers in Rochester, N. Y. This piece of equipment is used primarily to build up armature shafts that have been worn down due to bad bearings. Instead of turning down the worn shaft and using special bearings this shop sprays molten metal



METAL SPRAYING is used to build up worn armature shafts in this Rochester motor repair shop. Standard bearings can then be used and the time ordinarily wasted waiting for special bearings is saved.

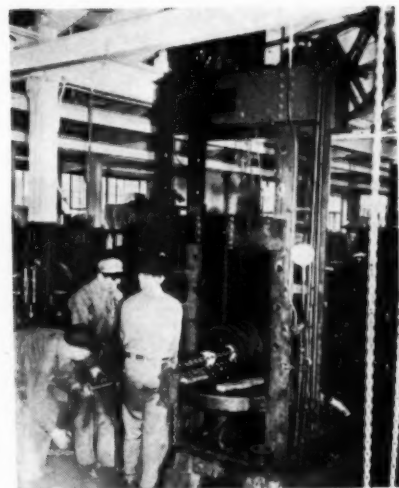
on the shaft to build it up, then turns it down to fit standard bearings.

Steel wire is fed into the gun and an acetylene flame and compressed air melt the wire and spray it through a fine nozzle on the shaft in much the same manner as a paint spray. The molten metal is sprayed on the shaft while it is turning in the lathe to assure uniformity of thickness over the entire length to be built up.

Bearing replacements on motors repaired in this manner can be made easier and less expensively since standard bearings are used. The time lost in waiting for special bearings is saved.

SHAFT PRESS

Adequate shop equipment makes easy work of jobs like the one shown in the accompanying photograph at the Tri-



INSERTING SHAFT in a 100 horsepower rotor is started with jack screw and chain, then pressed in.

State Armature and Electrical Works in Memphis, Tenn. Pressing a shaft into the 100 horsepower rotor is started by a chain and jack screw as shown. The 200 ton press finishes the job.

MOTOR TESTER

Compact, complete and portable and thus convenient is the new motor tester designed and built for its own use by the California Electric Works, Ltd. in San Diego, Calif. Made to test motors from 0 to 2 hp. the testing bench, mounted on casters, and with an adjustable screw mechanism to raise or lower the testing platform, combines a dynamometer, calibrated to read directly in



FRONT VIEW of small motor tester of California Electric Works, Ltd., San Diego, Calif. Chart of motor ratings and standards swings on a bracket at the side.

EASIER TO INSTALL

...easier to use!



LARGE WIRING SPACE

Type SD push button cases are small and compact, yet provide ample wiring space inside around entire button unit. Knockouts at top and bottom make wiring easy.

Control circuits are easier to wire... easier to operate... with new Westinghouse Type SD Push Buttons. Their rounded, compact design saves space... their clearly numbered terminals make wiring simple. Symmetrical design allows mounting with either end up. Once installed, the generous-sized buttons, shrouded to prevent accidental operation, insure handy, convenient and dependable performance.

Type SD push buttons are available in single, double and multiple circuit stations, in special mountings and as units for built-in applications. Write for the new bulletin describing them — ask for bulletin 15-020

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Dept. 7-N.

J-20882

Westinghouse

Type SD Push Buttons

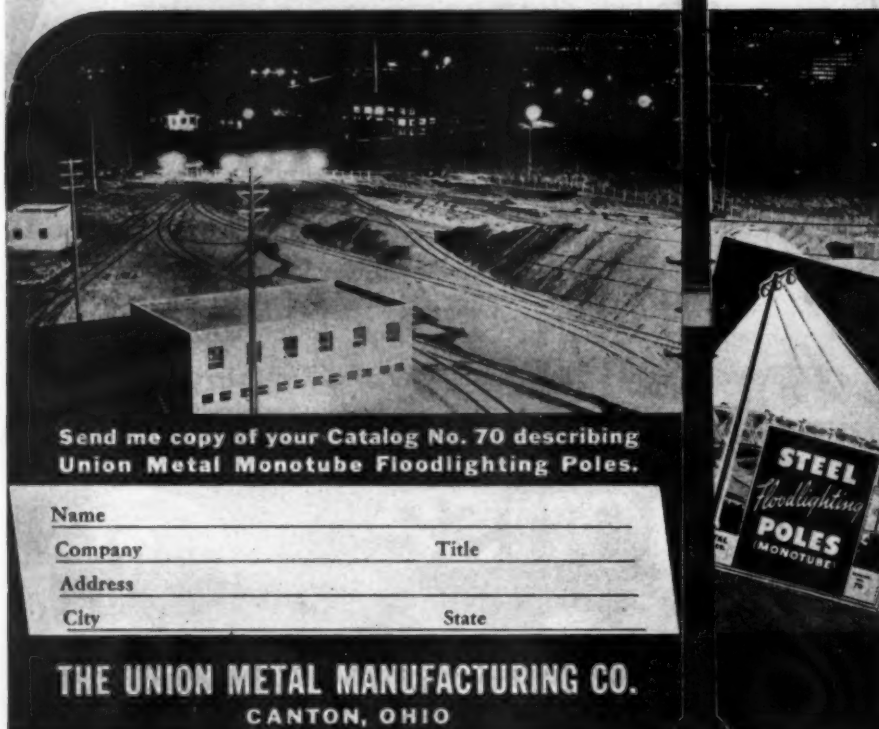


MODERN FLOODLIGHTING PROTECTS BOTH PROPERTY AND PRODUCTION SCHEDULES

PROTECTION against sabotage isn't the only factor which dictates the need for more and better floodlighting throughout industry. Demands created by our national defense program will force many plants to work double and triple shifts during the months to come. Well-lighted storeyards, sidings, etc., will be essential if production schedules are to be met.

When you figure these floodlighting jobs, remember—Union Metal offers a complete line of Monotube Steel Poles that will simplify your installation problems and serve your customer better in the long run. These modern mountings meet every floodlighting requirement as to height and strength. They are attractive in appearance, easy to erect, and their all-steel construction assures long life and low-cost upkeep.

Write for FREE catalog describing the complete line of Monotube Steel Poles for floodlighting service.



Send me copy of your Catalog No. 70 describing Union Metal Monotube Floodlighting Poles.

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CANTON, OHIO

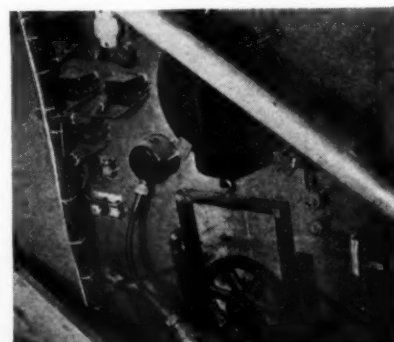
Motor Shops

[FROM PAGE 30]

horse power, a voltmeter, ammeter, wattmeter and various testing leads for 110 or 220 power. It is also equipped with double rectifier tubes to provide direct current for d.c. motors or generators.

In operation a small motor, after re-winding, is placed on the bracket platform, adjusted to the correct height to connect with a lathe chuck head which grips the end of the motor shaft. Test and ground leads are brought from the side and the motor operated against loads. An rpm counter, also on the panel, shows the effect of loads on speed.

Power is delivered to the portable motor tester through a plug at the back, single phase 220-volts and a ground wire comes through a cable to this connection. Ground wire is fastened to the frame and the 220-volt goes to the main toggle switch at the top of the board. The entire motor tester is dead except for the top of the main switch when on



REAR VIEW of testing panel showing arrangement for applying braking effect of the scale to the shaft. The rpm counter is at the left.

the off position. Pilot lights at the side of the main switch light when the switch is on. Next two switches are for two ranges of either the wattmeter, or ammeter. Another switch obtains either 110- or 220-volt at the leads. When using 220-volt supply, wattmeter readings are multiplied by two. Another switch marked "mg" is used for the horsepower test. The last switch is a ground test switch with an indicating light, the light burning if a ground exists.

Voltage may be lowered to cover the ranges of approximately 85- to 115- or 170- to 230-volts by means of a rheostat wheel below at the right. The wheel on the other side is for applying various horsepower braking to the test shaft.

...OUT OF THE BEATEN PATH...

Copperspun TO MAKE A FINER MOTOR

THIS is a picture of a rotor from a Fairbanks-Morse Motor

Notice the squirrel cage winding!

It is of copper. The *one* metal most desirable, electrically and mechanically, for meeting the severe service a modern motor must withstand. Copper, the *one* metal of low resistance and low thermal expansion—best able to withstand high temperatures caused by constant plugging and reversing service.

Note further that this copper is *centrifugally cast* into a one-piece winding. *Centrifugally cast* to imbed the winding into the core slots deeply and tightly.

Then, after casting, this rotor is machined and dynamically balanced to the famed Fairbanks-Morse standards of precision.

Only Fairbanks-Morse makes rotors with copper windings which are centrifugally cast. The Copperspun Rotor is an exclusive Fairbanks-Morse development, process, and feature.

For complete information on F-M Motors with Copperspun Rotors, write Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Ill. Branches and service stations throughout the United States and Canada.

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DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

Industrial Electrification and Maintenance

PREVENTING DISTRIBUTION FAILURES

TO modern industrial plants, maintenance is an important part of the plant organization. Production schedules must be maintained and shutdowns eliminated. To maintain high plant efficiency, preventive maintenance should be practiced. And this really begins when the electrical system is designed. If it has not been done at that time, it can be accomplished during modernization programs. If the design covers everything that must be accounted for—voltage drop, system capacity, load factor, demand factor and so on—the maintenance man's path will be relatively smooth. If not, once the plant is operating at full capacity or a slight overload, he will bear the responsibility of a costly shutdown here, or a breakdown there and the unnecessary hustle and bustle to try to keep things running.

In the next few months many plants will be using departments that have been idle for many months—perhaps a year or more. Just what is the maintenance electrician's job here—before operation begins? Suppose old and obsolete equipment lets him down. Should he have it repaired, fix it himself, or buy new equipment? What should he look for when buying new equipment? What factors affect the operation of a plant electrical system? What are the remedies for the most common ailments of the electrical system? What can the electrician do to prevent failure? The answer to these and many other questions are found in the accompanying discussion on Preventive Maintenance.

Last month the article covered—

1. Simplifying Electrical Maintenance
2. Preventive Maintenance of Distribution Systems (this issue)

Further articles will discuss

3. Preventive Maintenance of Electrical Equipment
4. Reducing Power Costs
5. Maintaining Good Power Factor
6. Meeting Severe Service Conditions
7. Safety Protection for Electrical Operations
8. Increasing Flexibility of Electrical Service
9. Providing Adequate Capacity for Increased Demand
10. Extending Automatic Control
11. Electrifying Operations to Reduce Unit Costs
12. Methods for Handling Changeovers and Live Circuits

Preventive Maintenance

Presenting an 11-point program for supervising industrial electrical systems. This article covers problems of distribution systems. Next month we will give similar data on basic types of equipment.

ONE measure of the effectiveness of maintenance operations is the extent to which emergency work does not have to be done. A well-planned maintenance program foresees trouble by making original installations as perfect as possible, and then carrying on constant supervision in order to provide continuity of service and to prevent production interruptions. Such a program usually will reduce direct electrical maintenance costs. But even more important, it will greatly improve plant operating efficiency.

Preventive maintenance should be a primary consideration: (a) in designing installations; (b) in ordering apparatus and supplies; (c) in the day-to-day operation of the complete electrical system.

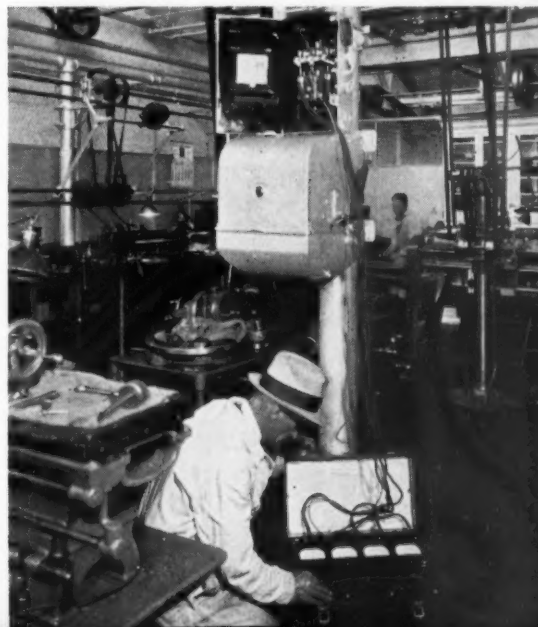
The following summary of preventive maintenance methods applies to the over-all operations of most plants. Additional problems must of course be faced in individual plants, due to special conditions. While the solutions of these specialized problems cannot be included in an article of this kind, many of them can be solved by applying the principles given in the following summary.

1. MODERNIZATION is one of the most effective of all preventive maintenance measures. Apparatus and wiring both have definite limits of useful life. Unfortunately, too many plant executives do not realize this and insist that old material be kept in use, with resultant

direct inefficiency, too-frequent shutdown of production, increased maintenance expense for labor, repairs and parts—all of which adds to the production cost.

A definite modernization program, on the other hand, not only progressively eliminates the older electrical equipment in the plant with the savings and improved efficiency that accompanies it, but also gives to the plant the early and full advantage of new electrical de-

REGULAR CHECKUP with instruments enables the electrician to diagnose the system condition and keep one step ahead of trouble. Serious shutdowns are eliminated and plant efficiencies increased. (Weston Photo)



velopments. For instance, through such a program, old reflectors are not merely replaced—they are superseded by new fluorescent units giving more and better light. Old motors are not kept going until they burn up completely and halt production—they are replaced, after reasonable service, with the latest units on the market—units that are more efficient, more compact, sturdier in design, able to withstand greater overloads. Similar effective results can be obtained from the modernization of other parts of the plant electrical system—controls, wiring switchboards, panelboards and many other items.

In short, the broadest and also the first step to take in preventive maintenance is the setting up of a full-fledged and carefully-planned modernization program.

2. LOW VOLTAGE is a hidden menace on distribution systems that shortens the life of motors, reduces lighting efficiency and adds needless dollars to the electric bill. Yet low voltage conditions are easily discovered—just connect up a voltmeter; and easily remedied—just install more copper (except in instances where bad power factor is causing a large impedance drop). For data on such cases see our May, 1940 issue, pages 12 and 13.

Here is what low voltage does:

It reduces the starting torque of motors.

It is a cause of overheating when motors are forced to carry their rated loads.

It cuts down the ability of a motor to carry heavy overloads.

It reduces the lumen output of lamps, and output-per-watt drops off more sharply than the ratio of the lower voltage to normal voltage.

Sound engineering practice calls for not over a 2 per cent voltage drop from switchboard to the most remote load. Of course even when this condition is met, the terminal voltage at motors or lamps will still be too low if the switchboard voltage is low to start with. If this is a permanent condition, new wiring cannot bring voltage up—so motors and lamps should be purchased for the lower voltage at which they will actually operate. Another method, where the voltage at the service drops to a value below standard equipment ratings, is to change the service transformers to the type that have a number of additional primary voltage taps. Frequently manufacturers are able to install these taps on present transformers. To do this may prove more economical than to rewind or buy all new motors and equipment. It all depends on the size of the plant and load. Both the equipment manufacturer and the

power company should be consulted in such extreme cases.

In the design of new wiring systems, or re-wiring, care should be taken to follow the revised cable and wire capacities which the new National Electrical Code demands. The new tables greatly reduce the allowable carrying capacities of the large sizes of cables, and this in itself will help to keep voltage drop at a minimum in jobs designed under Code standards. On the other hand, small wires are in some cases allowed to carry increased currents. Here particular care must be taken to be sure that voltage drop does not become excessive.



GOOD VENTILATION of electrical conduits in this steam pipe tunnel is secured by racking them on wall opposite the steam pipes. Where this is not possible conduits should be below hot pipes and hot air currents.

3. POWER FACTOR correction is such a broad and important subject that a later article in this series will deal with it exclusively.

A preventive maintenance program is not sound unless it recognizes the trouble as well as expense that can be caused by low power factor. These include needless energy loss in wiring, needless overheating of apparatus, and penalty charges from the power company for excessively low power factor.

First of all, care should be taken in selecting equipment. Incandescent lamps and most industrial electrical heating equipment have inherent power factor so close to unity that they present no problems. But induction motors, uncorrected fluorescent fixtures, and any inductive equipment can cause dangerously low power factor.

But sometimes low power factor exists because certain motors or apparatus simply must be used, regardless of poor characteristics. In such a case, power factor corrective methods should be adopted. Capacitors or synchronous motors can be connected to the circuit with poor power factor. It should be remembered that this correction is effective only from the point of con-

nection on the line back to the generator. To improve power factor on a given circuit or feeder, the corrective equipment should be connected at or near the load rather than at the switchboard bus where the over-all or plant power factor alone would be corrected and only the generator would benefit.

Low power factor is not caused by equipment alone. When planning an installation of large cables, the effect of power factor must be considered carefully, for if these large cables are spaced several inches apart the reactive effect may cause a very large voltage drop. In fact, whenever low voltage exists on a large feeder, one of the first steps in locating trouble should be the testing of power factor.

4. OVERLOADING of the feeders and branch circuits in a distribution system should be eliminated. The maintenance electrician should keep an accurate record of the total connected load on the system and make a careful check before additional load is added. In a building designed for a specific connected load, it is very easy to install more machines and equipment or larger machines and, while providing adequate capacity in the branch circuits, overlook the subfeeders and main feeders. Overloaded feeders mean (a) increased voltage drop, hence inefficient operation of equipment; (b) overheating of the conductors which injures conductor insulation and eventually causes distribution failures.

When these overloaded feeder conditions arise, relief can be provided by (a) installing larger feeders, (b) installing additional feeders or (c) in plants where dual voltage motors are used, increasing the distribution voltage. In one plant this was accomplished by changing the voltage from 220 to 440 volts. In some cases motors are easily reconnected from one voltage to another and this may prove more economical than installing new feeders.

5. OVERHEATING must be guarded against. Electrical conductors as well as electrical equipment are rated on a temperature basis because heat is generated wherever a current flows, and the temperature must be kept within reasonable limits to avoid baking and deterioration of the conductor insulation. Care must be taken that due consideration is given to the ambient temperature of the room in which the feeders are. Due to changes in processes and moving of departments, the temperature in existing rooms may be higher than that for which the original installation was designed. Conductors with the proper type of insulation should be used or as in some cases,

MAINTENANCE GUIDE CHART

WHAT TO CHECK IN DISTRIBUTION SYSTEMS

Many plants may now be compelled to utilize departments that have been idle or running at light load for some time. Other plants will build additions to existing buildings. In either case, much new equipment will probably have to be installed. Before such departments go into a full-time heavy production schedule, the following points should be checked and the questions answered.

SERVICE TRANSFORMERS

1. Are they large enough to carry the connected load?
2. What spare capacity do they have for additional future load?
3. What are the actual primary and secondary voltages at the transformer terminals?
4. How many primary taps does each transformer have for changing transformation ratios in case of low voltage at the service? Are they 2½, 5, 7½ or 10 per cent taps?
5. Has the transformer oil been checked, filtered and tested for quantity, pureness and dielectric strength?
6. Are the lighting transformers of the proper type, size and voltage?
7. Can air cooled transformers be used to feed lighting circuits from existing higher voltage feeders?

SWITCHBOARDS AND PANELBOARDS

1. Are the switches or circuit breakers of the proper capacity and voltage?
2. Are the switch blades, clips and fuse clips dirty, corroded or burnt? Do they have the proper tension?
3. Are the circuit breaker contacts dirty, corroded or burnt?
4. Are bus bar capacities, spacings and insulations adequate for the new amperage and voltage?
5. Are the switchboards and panels located in hazar-

dous atmospheres? Are they exposed to dampness, heat, dust, lint or corrosive and explosive vapors or fumes? If so, are they properly protected, or should they be moved to new locations?

6. Are the fuses of proper size and circuit breakers correctly set to provide the necessary protection to the feeders and equipment?

FEEDERS AND BRANCH CIRCUITS

1. Are all feeders and branch circuits of sufficient size to carry the present or new load? Do they provide any spare capacity?
2. What is the condition of the conductor insulation? Is it of the proper type and quality for new conditions such as high temperature, moisture, corrosive vapors or fumes?
3. Are the conductors encased in raceways providing adequate mechanical protection? Are these raceways properly mounted and securely fastened? Are all fittings and junction boxes provided with covers and gaskets where necessary?
4. If open wiring is present, is the braid on the cables in good condition? Will any new factory machinery subject these wires to mechanical injury, excessive moisture of corrosive and hazardous fumes?
5. Are all splices and taps electrically perfect? Has vibration, heat or corrosion weakened them? Has the insulation deteriorated or disintegrated?
6. Are all equipment and system grounds of adequate size, in good condition and securely connected? Are all circuits free of grounds?
7. Will the conductors become overheated because of overloads, room temperatures, conductor crowding, mounting near steam pipes or in other warm areas?
8. Is there ample natural or forced ventilation to reduce temperature rise in feeders located in hot atmospheres? If not, can it be provided?

INSTRUMENTS AID PREVENTIVE MAINTENANCE

One plant, which has a definite testing routing for preventive maintenance, has an ideal set of instruments for making basic tests. This plant operates at 230-volts, 3 phase, 60 cycle. This set of instruments would take care of normal electrical measurement and survey requirements in most industrial plants. And considering the results which can be gotten in terms of freedom from breakdown and maximum efficiency, the cost is small. At current prices, this instrument set can be purchased for about \$1,000.00.

As an alternate for some of the meters listed below, a number of plants use power factor meters and compact combinations of various meters such as are included in the modern industrial analyzers.

THE INSTRUMENT LIST INCLUDES:

- 1—D.C. Voltmeter, 0-300 volts.
- 1—A.C. Voltmeter, 0-10 volts.
- 1—A.C. Voltmeter, 0-30 volts.

- 1—A.C. Voltmeter, 0-300 volts.
- 1—A.C. Voltmeter, Low-medium-high scale.
- 1—D.C. Ammeter, 0-150 amperes.
- 1—D.C. Ammeter, 0-1000 amperes.
- 1—A.C. Ammeter, 0-500 amperes.
- 1—Large clamp-on prong type ammeter, 0-50-100-400-600-1000 amperes.
- 1—Small clamp-on prong type ammeter, 0-20 amperes.
- 1—Foot-candle meter, 0-600 foot-candles.
- 1—Ohmmeter, 1000 ohms maximum.
- 1—Megohmmeter.
- 1—Recording meter to check cycle motor operation.
- 1—Wattmeter.
- 1—Polyphase recording watt-hour meter.
- 1—Single element watt-hour meter.
- 1—Three element, three phase watt-hour meter.
- 1—Chart inspection holder.
- 1—Tachometer, hand dial type.
- 3—Current transformers, 0-800 amperes.
- A number of meter shunts from 7.5 to 2000 amperes.

some form of forced ventilation employed. For example, cables installed in ducts which run in an approximately ground temperature of 60 deg. F. may heat up excessively if subject to heavy loads—and unless heat-resistant insulation is used the conductor insulation life will be materially shortened.

The following is an example of the use of forced ventilation. Sufficient air circulation around the cables near an annealing furnace was secured by mounting a motor-driven blower above one

of the manholes, connecting the intake of the fan to the manhole so that air could be drawn from it, through two adjacent 200-foot duct runs. The fan, driven by a 2 hp. motor, will deliver 70 c.f.m. at a discharge pressure of about 7 inches of water.

Good preventive maintenance would, of course, avoid installing wiring in such a hot location as noted above. Steam tunnels represent another highly undesirable location for feeder runs. Often, however, this is the only con-

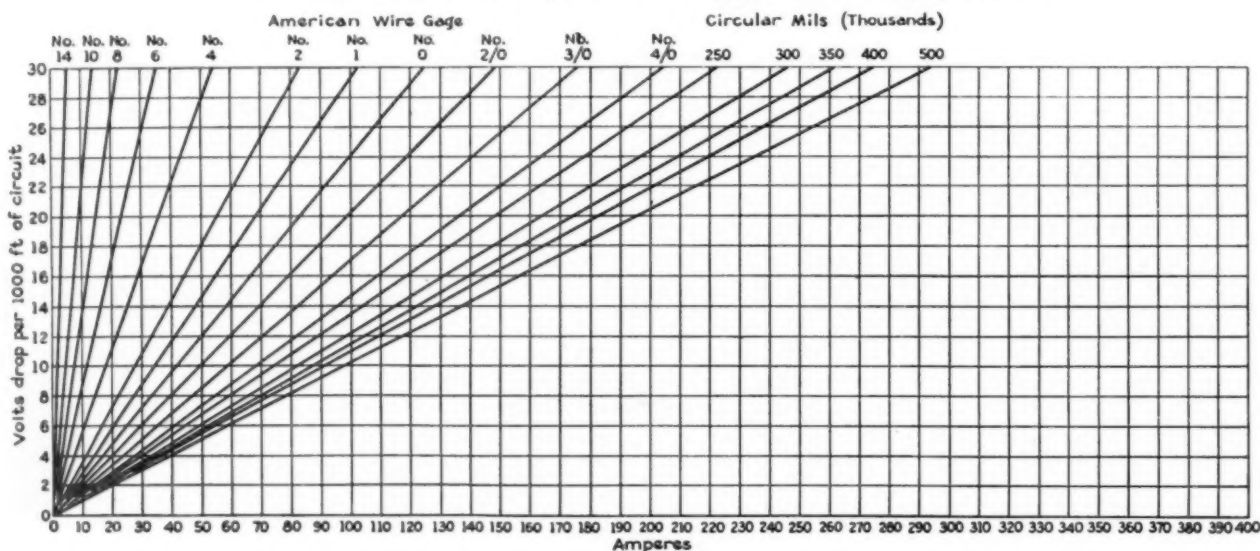
venient way of running wiring from one building to another. To offset the relatively high temperatures met in such a place, suitable heat-resistant insulation should be used. If this cannot be installed, a partial solution can be gotten by running electrical conduits below the steam pipes. This will place them in a relatively cooler position. Since there may be considerable sweating of walls in steam tunnels and the air is sure to be moist, all the conduit system should be made water-tight.

VOLTAGE DROP CHART

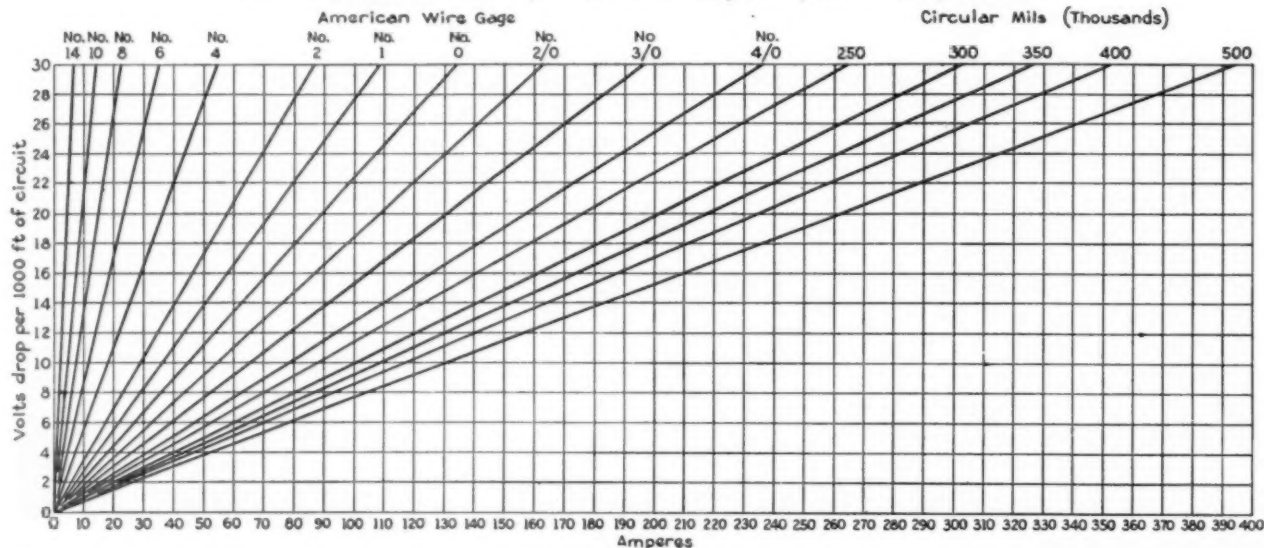
For checking voltage drop in conductors carrying rated current of connected apparatus, after having determined size of conductor to meet N.E.C. requirements.

THREE-PHASE CIRCUITS * — 600 VOLTS MAXIMUM

Three Single-Conductor Cables per Conduit in Magnetic (Iron or Steel) Conduit



One Three-Conductor Cable per Conduit in Magnetic (Iron or Steel) Conduit



*The voltage drop given in the curves is for a 3-phase circuit measured line-to-line. For a single-phase circuit with two conductors in the conduit, or a 2-conductor cable, the voltage drop measured from line to line will be 15 per cent higher than that given in the charts.

These curves apply to varnished-cambric or rubber insulation, nonleaded for single-conductor cable, leaded or nonleaded for three-conductor cable.

They apply only approximately to leaded cables of the single-conductor type.

These curves give maximum voltage drop for any load power factor considering only the cable itself. The actual power factor at which this drop occurs will be between 45 per cent and 100 per cent for the cable sizes in question, but is different for each individual cable size. For all other power factors, the voltage drop will be less.

(Courtesy General Electric Co.)

ROOM TO SPARE IN THIS NEW STARTER!

● Just look at those concentric knockouts in top, bottom, sides and back!

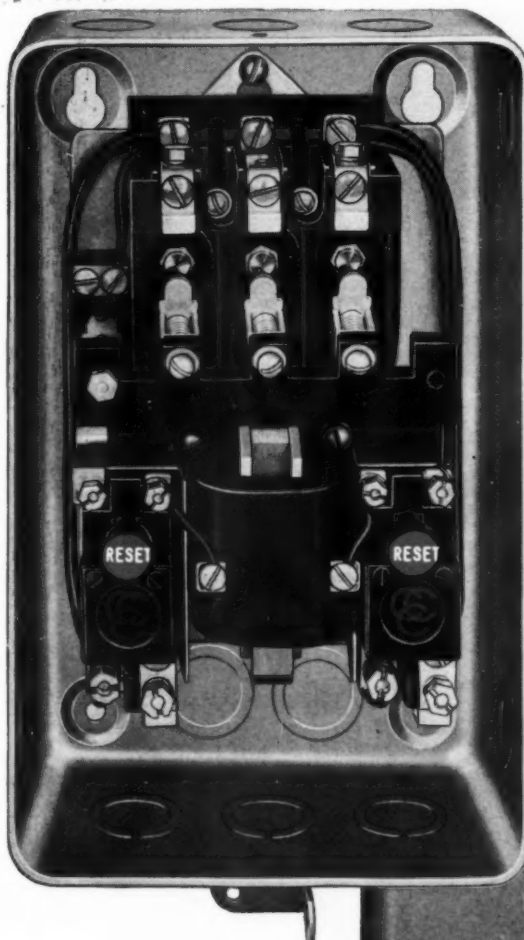
See that screw in the key hole at top? Just loosen (but do not remove) it — then loosen two screws (not shown in picture) in the forked bottom mounting feet, and the entire assembly lifts out. That makes it easy to wire, and there's oodles of space to tuck the wires neatly back into the cabinet and slip the mounting plate into position.

And what a honey of a Starter this is! Double-break, entirely visible silver-to-silver contacts.

Non-carbonizing arc shield withstands high temperature.

Enclosed Thermal Relays of solder pot type, with adequate time lag to prevent unnecessary tripping.

Hinged armature vertical lift magnet.



AVAILABLE

FORM MA (pictured) with overload reset button in cover. Separate pilot device required.

FORM MB with "MANUAL-OFF-AUTOMATIC" switch and reset button in cover.

FORM MC with "START" and "STOP-RESET" button in cover

"3C" BULLETIN 6013 SIZE DS-1

• R A T I N G •

VOLTS	Maximum H. P.	
	1 Phase	3 Phase
110	1½	3
220	3	5
440	5	7½
550	5	7½



WRITE FOR FULLY DESCRIPTIVE BULLETIN 6013, SIZE DS-1

OFFICES IN PRINCIPAL CITIES



THE CLARK CONTROLLER CO.



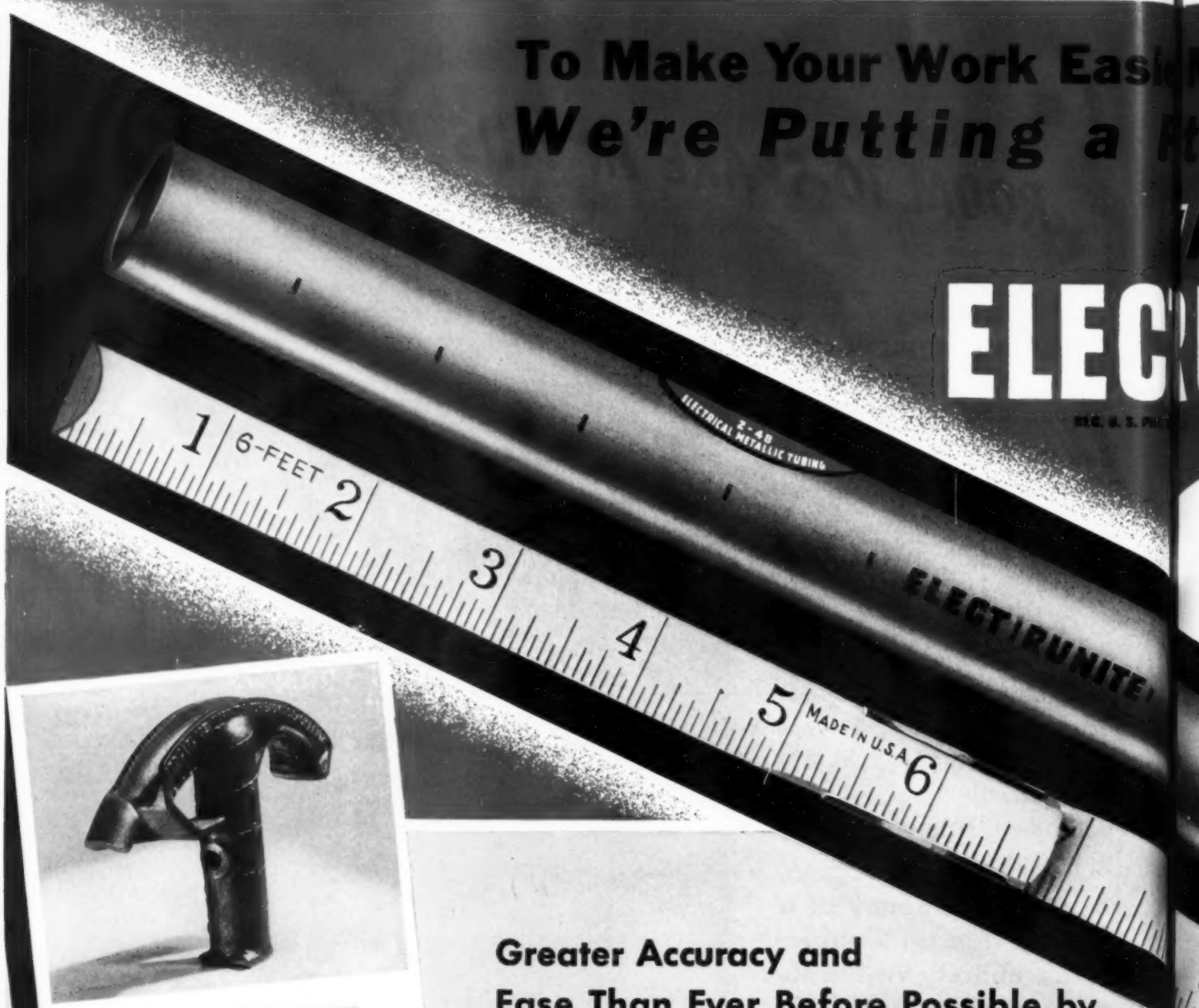
1146 EAST 152ND ST.

CLEVELAND, OHIO

To Make Your Work Easy
We're Putting a

ELECTR

REG. U. S. P.



This New ELECTRUNITE Bender Will Help You Use "Inch-Marked" ELECTRUNITE STEELTUBES To Best Advantage

With this new bender and "Inch-Marked" ELECTRUNITE STEELTUBES, you can make any needed type and size of bend easily, quickly and accurately.

The new ELECTRUNITE Bender (Pat. No. 111,870) is a one-piece malleable iron casting, with no moving parts to get out of order. Simple instructions and markings for making stubs, back-to-back bends and offsets are actually built into the side of the bender so the instructions can never be lost. Standard Code radius bends can be made with less flattening than ever before possible.

Greater Accuracy and Ease Than Ever Before Possible by Making Bends the ELECTRUNITE Way

"Inch-Marked" ELECTRUNITE STEELTUBES and the new ELECTRUNITE Bender were designed to provide you with the ideal combination for making exact bends simply and with little effort. A third help is the new bending tag which accompanies each bender and each bundle of tubing. On it are printed diagrams and detailed directions for making various types of bends.

Thus, with tubing that already is measured to the inch for you and with a bender that predetermines and produces bends to exact size, you can't go wrong if you follow instructions on the tag. That's the ELECTRUNITE way of working more easily and more accurately.

More Accurate... More Economical... Foot-Rule on Every Length of "INCH-MARKED" ELECTRUNITE Steeltubes

● Now, when you want to cut a length of ELECTRUNITE STEELTUBES... when you want to make accurate, uniform, predetermined bends... *it's easy to find your mark and keep it.* Every length of "Inch-Marked" ELECTRUNITE STEELTUBES has a foot-rule attractively and clearly printed in blue ink right on the tube. The awkward task of holding a rule against the

tube to measure the required distance is ended.

Think what this improvement in conduit can mean to you on the job. Just imagine how much easier it will make measuring, cutting and bending—how it will help you to make more accurate bends, reduce loss due to error or guesswork and produce neater installations. Once your workmen use it, they'll prefer it.

"Inch-Marked" ELECTRUNITE STEELTUBES is being made available through ELECTRUNITE Distributors as quickly as production facilities permit. Use it on a job as soon as possible—and see how much easier

it makes electrical installation. Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio.

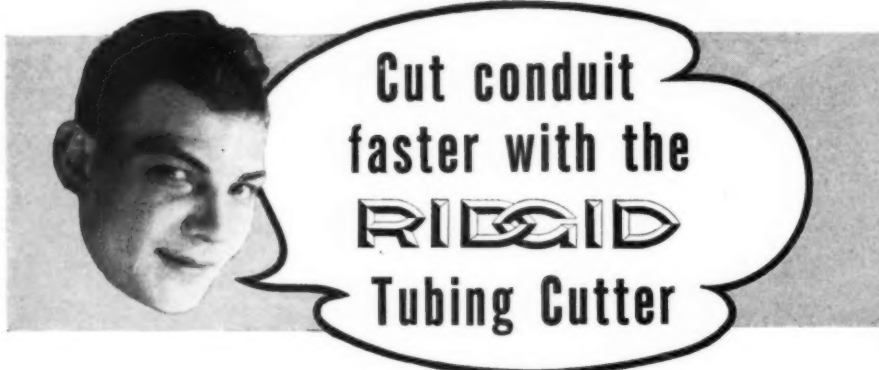
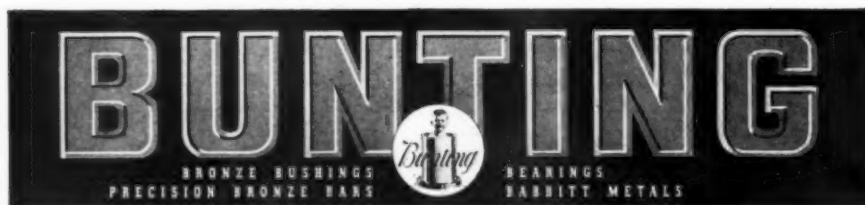


Now you have two means for identifying genuine ELECTRUNITE STEELTUBES—the original and pioneer electrical metallic tubing. Ask for ELECTRUNITE STEELTUBES and be sure you get it by looking for the inch-marking and this new red and black label on every ten-foot length.





● Bunting replacement electric motor bearings fit without a struggle. Made to the exact dimensional specifications of the original. Available from stock for all makes of motors from 1/50 hp to 100 hp. Bunting's Catalog in your desk drawer will save you time and money. Write for it... The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in All Principal Cities.



RIDGID
TUBING AND
CONDUIT CUTTER
CAPACITIES
1/8" to 2 1/8"



YOU'LL be surprised at how quickly and cleanly this cutter rolls through thin wall conduit and copper tubing. High grade tool steel cutter wheel gives you more cuts per wheel. Two rollers smooth cut edges leaving no burr. Has handy integral reamer. Three sizes capacities 1/8" to 2 1/8". Compact, hand-size—you enjoy using it.

Electricians everywhere have been discovering this smooth-working **RIDGID** Tubing Cutter. Try one and you see why—buy it at your Supply House.

THE RIDGE TOOL CO., ELYRIA, OHIO



Power Cost Reduced in Cleaning Castings

Sand-blasting in an enclosed space was the method used to clean castings at the foundry of Charles Parker Co., Meriden, Conn. The cost was approximately \$2 per hour for compressed air supplied at 90 to 120 lb. per sq. in., with a compressor driven by a 75-hp. motor.

A saving of 46 hp. was effected by the installation of a Wheelabrator Tum-Blast machine. The machine is driven by a 15-hp. motor; a conveyor by 2-hp. motor; and a blower by a 12-hp. motor.

Castings to be cleaned are carried by the conveyor to a point where an abrasive blast of steel shot is thrown on the work, by centrifugal force from a high-speed wheel. The abrasive is returned to the center of the wheel by screw and bucket conveyors.

Humidity and Temperature Controlled

A statement of conditions regarding an evaporative cooling and humidifying system at Carter Fabrics, Inc., Greensboro, N. C.

Problem: To design a system to properly provide for humidification and evaporative cooling sufficient to absorb all the internal heat liberated within the conditioned areas, such as from the motors, employees, lights, and other heat sources, thereby lowering room temperatures. The air conditioning system should provide ample ventilation so that continuous evaporation of large quantities of water is possible,

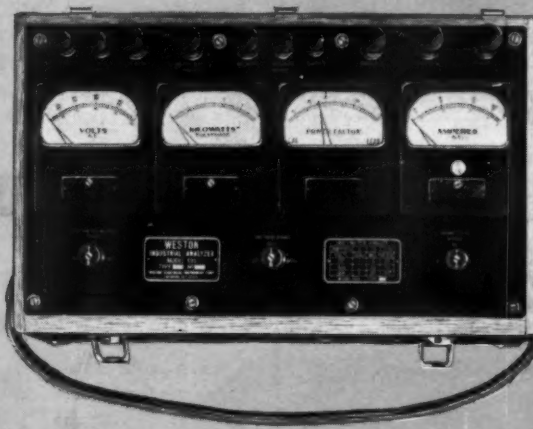


CONDITIONED AIR is supplied to this textile mill, through ducts from two central stations (photo courtesy Cooling and Air Conditioning Div., B. F. Sturtevant Co.)

KEEP YOUR "WHEEL TURNING" PROGRAM "in Gear" WITH WESTONS



WESTON Clamp-Ammeter—
for time saving current meas-
urement... trouble-shooting.



WESTON Industrial Analyzer— for mainte-
nance testing... checking industrial loads.



**WESTON foot-Candle
Meter**—for maintaining
lighting at efficient levels.

Here are three WESTON instru-
ments that can do a real "wheel
turning" service in assuring the effi-
cient functioning of all electrified
equipment... and the efficient utilization
of power throughout every department.
» » » For industrial maintenance, as well as
for utilities and contractors, the WESTON
Clamp-Ammeter and the WESTON Industrial
Analyzer are important aids to thorough trouble-
shooting and load-checking. With these versatile
tools, the maintenance man can do a better job...
and do it more quickly and efficiently. » » » And for main-
taining efficient, sight-saving lighting standards throughout
plants and offices, the WESTON Sight-Meter still leads the way.
It instantly measures all types of lighting direct, regardless of
color composition.

Remember, too, that the complete line of WESTON instruments
can meet your needs for switchboard and panel instrumentation,
laboratory research requirements, or for all production needs, with
the same combination of unquestioned accuracy and long-time
reliability. Weston Electrical Instrument Corporation, 672 Fre-
linghuysen Avenue, Newark, New Jersey.

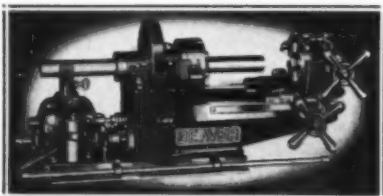
Laboratory Standards... Precision DC and
AC Portables... Instrument Transformers
... Sensitive Relays... DC, AC, and
Thermo Switchboard and Panel Instruments.

WESTON

Specialized Test Equipment... Light
Measurement and Control Devices...
Exposure Meters... Aircraft Instruments...
Electric Tachometers... Dial Thermometers.

FOR OVER 52 YEARS LEADERS IN ELECTRICAL MEASURING INSTRUMENTS

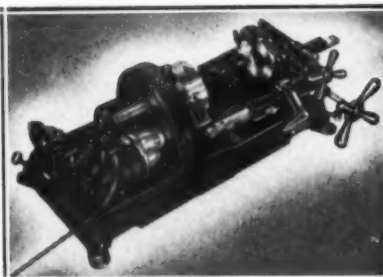
The A-B-C of . . . Pipe Machines!



Model-A

A high-speed heavy-duty deluxe Pipe and Bolt Machine. Range $\frac{1}{4}$ to 2-inch-up to 12-inch with geared tools and drive shaft. Bolts, $\frac{1}{4}$ to 2-inch. Wt. 415 lbs.

From \$309.50 up
Write for Bulletin A



Model-B

Big Brother to Model-C Power Unit. A light-weight utility Pipe and Bolt Machine combining many features of Model-A with the easy portability of Model-C. Range $\frac{1}{4}$ to 2-inch up to 8-inch with drive shaft and geared tools. Bolts up to $1\frac{1}{2}$ -inch. Weight 280 lbs.

From \$217.50 Up
Write for Bulletin B



Models C-1 and C-2

A sturdy little Power Unit Converts hand pipe tools into power tools from $\frac{1}{4}$ to 8-inch. Threads 8-inch in 6 minutes. Threads bolts up to $1\frac{1}{2}$ -inch. Two men can work at the same time without interference. Weight 150 lbs.

From \$125.00 up
Write for Bulletin C

Write for new Tool and Machine
Catalogue—Just off the press

BEAVER PIPE TOOLS

740 Deen Ave. Warren, O.

thereby maintaining well humidified conditioned areas.

Solution: Two central-station humidifying and evaporative cooling systems were installed, one for the preparation room and one for the weave room. Each system consists of a centrally located spray chamber of the air-washer type, through which air is drawn from out of doors by means of a fan, mixed with recirculated air, filtered, washed and saturated. It is mixed with bypassed air, and delivered through a distributing duct system to the conditioned area. By separately controlling the temperature of the spray water, reheating as required, and air volumes, the desired conditions of humidity and temperature were obtained.

Results: The air conditioning, humidifying and evaporative cooling systems insure controlled relative humidity, and balanced weather. The temperature is uniformly low because of maximum evaporative cooling capacity, and air is evenly distributed throughout the rooms; thereby assuring uniform production, eliminating seconds, protecting high-grade quality, and providing ample ventilation, clean air, wholesome and healthful working conditions for the employees.

Compact Motor Control Panel Saves Space

In a southern pulp and paper mill, large motors are used on circuits at the generated voltage. Motors of 50 hp. and smaller are operated on 440-volt circuits, supplied with power from either a central or a group of step-down transformers. The smaller motors comprise a large number, averaging approximately 15 hp. each, and located closely together in the various departments.

Full voltage starting of motors is possible at both voltages, with few, if any, exceptions. For the 440-volt motors combination line starters, consisting of either fused safety switch or thermal breaker as line switch and magnetic starter furnished in standard enclosures, are racked in groups at the available locations.

Following the trend of modern switchgear built in metal-clad or cubicle housings, a similar standard has been followed for the 440-volt control. As in the well-known door-in-door lighting panel design, power panels were assembled by the control manufacturer. A single-width sheet-steel cabinet was used for starters for motors up to 25 hp., and double-width for 50-hp. motors, complete with bus and connections, and having ample space for motor and push-

WHEN IT'S
INDUSTRIAL WIRING
JOBS
YOU'RE AFTER

**B & D CLEATS
ARE THE PROFIT-
ABLE ANSWER**



An increasing use of B&D Cleats on new industrial wiring jobs bears proof to the old adage of "Survival of the Fittest." Used for more than forty years, the safety of industrial jobs wired with open cables supported by porcelain B&D Cleats, especially for overhead spans, has been proved by generations of trouble-free service. The economy of this system of wiring is a matter of record. In addition you get ready accessibility, ease of making extensions, alterations, tapping branch or feeder lines . . . and ease of inspection, the entire system being in plain sight. To top it all you get a system with increased heat dissipation and, therefore, greater current carrying capacity.

See your jobber for our complete line of porcelain insulators for industrial wiring or write direct.

PORCELAIN PRODUCTS, INC.
FINDLAY, OHIO

Don't Spend Hours
Chiseling Holes
in Concrete!



**DRILL HOLES
50-75% FASTER!**

Amazing new drill-point contains special metal harder than hardest steel. Goes through concrete, tile, slate, porcelain, etc., 50 to 75% faster. Drills cleaner, more accurate holes. Speeds up installation of expansion anchors. Saves your skilled time for more profitable work. Eliminates noisy hammering, monotonous chiseling. Doesn't splinter fragile work. No special equipment needed—use in any rotary drill. Get your share of those extra profits now possible. Send coupon for leaflet.

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Carboloy Co., Inc.
11135 E. 8 Mile Rd., Detroit
Send free leaflet on Carboloy Masonry
Drill-Points, for drilling 75% faster.

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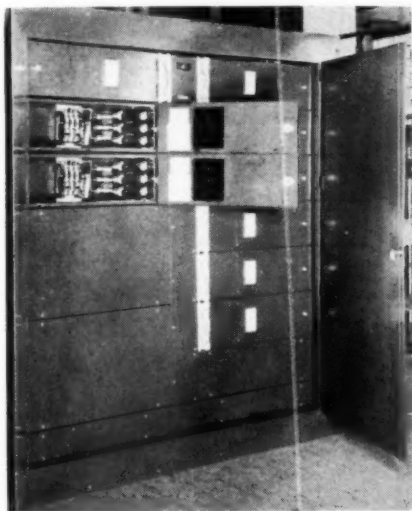
City _____

State _____

CARBOLOY
MASONRY DRILL-POINTS

button leads as well as incoming main feeder cables.

Only a small fraction of floor space is required by using the compact panel, as compared to the conventional racked assemblies. This type of panel permits placement at the load centers. Where



COMPACT CONTROL PANEL for one department, consists of two sections mounted back-to-back, 76-in. long, 82-in. high and 18-in. deep, has 20 circuits and space for 7 additional circuits.

operating conditions dictated, close-fitting brick enclosures with access door and ventilation holes were provided to protect against splash, drip or dust. Ammeter jacks were provided in each motor control cabinet for tests of the individual circuits.

Heater Tab On Switch Cover

The maintenance electrician in an eastern rock crushing plant makes thermal heater replacement on motor starters a simple chore.

He pastes a tab, containing the catalog number and ampere rating of the heater, on the inside of the switch cover. A coat of clear varnish or shellac over the tab protects it against grease, oil and dirt. A listing of all the motors with the type of control and heater element size is also kept in the electrician's office.

When anything goes wrong with the motor the operator gives the heater information, taken from the switch cover, to the electrician and he brings a set of elements with him, thus saving return trips to pick up the heaters.

This method of labeling is especially helpful in cases where heater elements slightly heavier than normal rating are necessary because of the abnormally high room temperatures. Often the correct size heater in these instances had to be determined by trial and error.

Electrical Contracting, August 1940

Avoid FREQUENT REPLACEMENT



Free — a seventy-six page catalogue that lists, illustrates and describes the most complete bearing service available. Write for a copy—Today.

JOHNSON ELECTRIC MOTOR BEARINGS

● The life of an Electric Motor Bearing is determined by the alloy of the bronze. Such operating factors as high speeds, overloads, grit and dust must be provided for. Johnson Bearings are cast in a special high lead bronze that guarantees the maximum in performance. Try a pair on your next overhaul. There is no delay in shipping—and the bearings are fully machined, ready for immediate installation.



JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

490 S. MILL STREET • NEW CASTLE, PA.

WORLD'S FAIR TRANSFORMER INSTALLATIONS

20 page
BULLETIN
JUST OFF
THE PRESS
(3 colors)

Shows photos of
New York World's
Fair Buildings and
important transform-
er installations.



Also illustrates a complete line of transformers for every service.

Plant expansion programs necessitated by National Defense will make these installations and the comprehensive survey of all types of transformers contained in the Bulletin very helpful in selecting transformers for specific jobs.

TEAR OUT AND MAIL THE COUPON TODAY

THE STANDARD TRANSFORMER CO., WARREN, OHIO

Send World's Fair Transformer Installations Bulletin to:

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Eliminate complications!



Approved by
Underwriter's
Laboratories

There's no extra turns or twists to make with B-M connectors and couplings. Just TWO SQUEEZES with the patented B-M indenter, and you have a smooth, efficient job.

YOU ALSO:

- Save 25% on materials
- Save 25% to 50% on time
- Make quick, easy installations
- Make stronger, neater connections
- Do no fussing with nuts to tighten



\$1.25 Buys the
Tool for Speed +
Accuracy For More Profits!

This one patented tool (1/2" B.M. Indenter) handles 80% of all installations. Pays for itself many times over on the very first job.

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BRIEGEL METHOD TOOL CO.
GALVA, ILLINOIS

For Better Service -

INSTALL



RENEWABLE FUSES
With the famous Powder-Packed Element

KLIPOK CLAMPS
Lock fuses and clips together



KANTARK FUSES
With genuine fibre tubes (not paper)

COLORTOP PLUG FUSES
The color tells the size



FUSE PULLERS
Pull and replace fuses safely



GLASS OILERS
For motors, line shafts, solid bearings etc



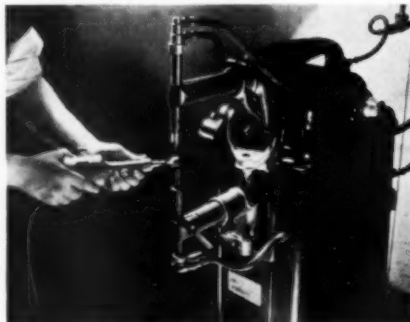
UNBREAKABLE OILERS
"Opto-Matic" Constant level type
Gravity Feed type

WRITE FOR FOLDER CPF-300

TRICO FUSE MFG. CO., Milwaukee, Wis.
In Canada: IRVING SMITH LIMITED, Montreal

Some Uses for Small Power Tools

When wearing parts need maintenance, it is not always necessary to remove them. Small electric power tools may be used. The following illustrations supplied by The Dumore Company of Racine, Wis., show some applications of hand grinders to eliminate teardowns of costly tool setups.



REMOVING CORROSION from spot welder points.



SHARPENING a hedge trimmer blade.



GRINDING top rake on form tool without having to remove tool from Warner-Swasey screw machine.



REFINISHING a worn spot on a punch-press forming die, right in the machine.

XL-WAY REBUILT MOTORS



Excel Electric Service Co. offers to discriminating buyers at a substantial savings **XL-way Rebuilt Motors**—"Re-manufactured the XL-way without a change in original manufacturers specifications."

• EXCEL gives you protection against loss of time and money when ordering renewal parts.—PLUS insurance that the motor is genuine and guaranteed.

• XL-WAY stock is ready for immediate delivery anywhere from 1/30th H.P.-1150 R.P.M.-D.C. to 75 H.P.-900 R.P.M.-A.C. Let EXCEL engineers solve your motor problems,—for further particulars write

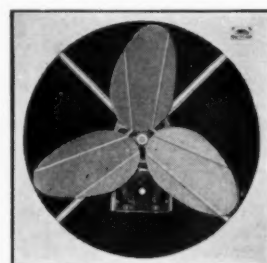
EXCEL ELECTRIC SERVICE CO.
2123 South Western Ave. CHICAGO, ILL.

DRILL CONCRETE the Easy Way



The old arm and hammer method is slow, hard and expensive. It's quick and easy with the Wodack "Do-All" Combination Electric Hammer and Drill. 2 tools in 1. Drills concrete to 1 3/4" and metal to 3/4" diameter. Cuts the cost of setting expansion anchors. Widely used by electrical contractors and industrial maintenance departments. Universal motor 110 or 220 V. Ask for Bulletin No. 400.

WODACK ELECTRIC TOOL CORP.
4628 W. Huron Street - Chicago, Ill.



LOW COST QUIET 1,001 USES

NEW, ALLVENT FANS

• Every office, store, factory, shop has need for one or more! New "V" Belt Drive makes possible QUIET operation—easy installation—different air capacities in same size fan! Lowest Cost—almost NO maintenance! Write for Bulletin 206.

AUTOVENT FAN & BLOWER CO.
1815-21 N. Kostner Ave., Chicago, Ill.

NEW SpeedWay

Not only far more for the money—actually more drill.

A tool and a price made possible by SpeedWay's 30 years' specialization in portable electric tools, and modern production methods. Every new feature: Streamlined, die cast case, forced air cooling, natural grip in-line breast plate handle, removable side handle, sliding switch, waterproof cord, molded plug, and a stallproof specialty wound, high torque, 500 RPM, 115 V Universal SpeedWay Drill Motor.

If your dealer can't supply, order direct on 10 day trial.

1" DRILL
\$24.50
Circular Free
SpeedWay Mfg. Co., 1866 S. 52nd Ave., Cicero, Ill.

Modern Safety Methods Pay Dividends

[FROM PAGE 18]

a guide for yourselves. How much or how little of this kit you will actually require will depend upon the size and the location of the job being performed. Together with this kit or in the cover of a tool box there should be on the job always a card describing simple first-aid treatment of injuries and also a card giving complete instruction on the prone pressure method of artificial respiration in case of electric shock, asphyxiation or drowning.

4. Shock and electrocution. If temporary wiring is properly installed and if electrically driven tools are properly grounded, this hazard will be kept at a minimum. Yet the taping of live parts and the grounding of dead-metal parts are not the only safe practices. The placing of temporary wires and electric tools must be planned with a view to operations that will occur near them. It is obvious that wires must be safely out of reach and properly protected. But it is your responsibility to get even the obvious carried out. Do not forget that a 110-volt shock can kill a man when his body is in good contact with ground.

A cooperative understanding with the general contractor should be established on every job for there is no question that safety on construction work is a cooperative venture. To get this cooperation, you must seek it: go to the general contractor, before you start a job, and find out exactly what you must do and precisely what he will do.

When the general contractor erects stagings which are used by all trades, you have a distinct interest in their

construction. Never allow your men to work on any staging that is not sufficiently braced and planked. And make this point clear to the general contractor before the building of the staging—not after it is up.

Cooperation with the general contractor is again the only way to assure that other trades will not interfere with the electrical program. It is always more dangerous when too many operations are going on at one time. When the electrical contractor goes into action, the scene of his operations should be as clear as possible of other trades and other than electrical materials.

If electrical work must be done beneath other operations overhead, such as steel erection, it is a vital rule that the electricians must be protected from things that may drop from above. This again is a matter to be arranged through agreement with the general contractor, but don't let your men work without protection: demand tight planking above them, if nothing better. And during finishing operations, have an understanding with the general contractor about keeping carpenters, painters and others from gaining entrance to transformer or switchboard rooms without proper supervision and protection.

If there is any "cure-all" available to the electrical contractor in his fight against hazard and injury, it is the liberal application of common sense. Plan a definite safety program, place the responsibility for its execution squarely on your job foreman and superintendent and stick to the regulations you make. You can then earn the added profits of a job well done, or reap the reward for carelessness: expense. So plan your safety procedure carefully—then see it through.



"I'm installing some electric outlets—your wife says when she wants to plug in, she wants to plug in!"

★With . . .

PAINE DRILLS

AND

ANCHORS

ON THE JOB YOU CUT
INSTALLATION COSTS

—AND MAKE MORE PROFIT—



**CONCRETE
STONE
BRICK
SLATE
TILE**

**MARBLE
MOSAIC
GLAZED BRICK
CAST IRON and
all Similar Materials**

**PAINE
"SUDDEN
DEPTH"
CARBIDE
TIPPED
ROTARY DRILLS**

You can make clean, uniform holes for Lead Anchors or Toggle Bolts in the hardest materials—faster and with less effort when you use this revolutionary Carbide Tipped Drill. It operates efficiently in any Portable slow-speed Electric Drill or Brace and Bit without fracturing the most fragile material. In addition, the Carbide Tipped Point—made from cemented Carbide—has a diamond-like hardness that holds edge 50 times longer than ordinary drills. Its quiet, smooth operation makes it ideal for use in busy offices, hospitals or other locations.

**PAINE
LEAD ANCHORS**

PAINE Extra Strength Lead Anchors make installations in Brick, Marble, Cement and Stone Walls or ceilings simple and easy. In addition, they can be used with utmost safety in fragile material. Their advanced design and rugged construction—from a special lead mix—assure a secure anchorage that prevents movement in any direction.



Fig. 910 Fig. 900



**PAINE
SPRING WING
TOGGLE
BOLTS**

Paine Spring Wing Toggle Bolts are specially designed to speed-up all types of electrical installations in hollow walls and ceilings. They are ruggedly constructed, Cadmium plated to resist rust and corrosion and have unusual holding strength. The wings are easily compressed and automatically spring to an anchoring position when slipped through bolt hole. They are furnished in any length or style to meet your requirements.

Ask your Supply House for PAINE "Sudden Depth" Drills, Lead Anchors and Spring Wing Toggle Bolts TODAY or write for complete catalog featuring Drills, Lead Anchors, Expansion Anchors, Malleable Shields, Toggle Bolts, Cable and Conduit Clamps, Romex Straps, Pipe Straps and Switch Boxes.

THE PAINE CO.
2961 CARROLL AVE., CHICAGO, ILL.
New York Warehouse & Sales: 48 Warren St.

Estimating

FLUORESCENT COVE LIGHTING

Indirect fluorescent lighting of an executive's office in a clothing store, was part of an electrical contract recently completed by a Syracuse contractor. This was accomplished by installing the lamps 9 feet above the floor, in a cove which goes around the entire room.

The office is 14-ft. by 16-ft. in size and twenty-three 24-inch, 20-watt Curtis fluorescent cove units were required to provide effective illumination. They were mounted end-to-end in the cove and connected to the panel by four circuits consisting of $\frac{1}{2}$ -inch conduit and No. 12 rubber covered wire. One-half inch flexible conduit was used to interconnect the units.

Channeling of the plaster ceiling and a portion of the office wall was necessary to reach the coves. The rest of the circuits were run in a false ceiling and channels left by other contractors.

The recorded labor for the installation was as follows:

CHANNELING CEILING—includes the necessary channeling and repair of the plaster ceiling and side walls to conceal the conduit feeders to the units.
Total time 24 m. h.

INSTALLING FIXTURES—includes connecting the fixtures end-to-end, mounting them in the cove, running the feeder circuits to the panels and making all connections.
Total time 40 m. h.

Any supervisory labor required on the job is included in the above figures.

Data from L. W. Kieswetter, Rochester, N. Y.

TROLLEY DUCT INSTALLATION

The lighting system in a manufacturing plant, recently constructed in New Jersey, consists of Trol-E-Duct with mobile fixtures to provide flexibility in spacing and increased lighting intensity in the future.

The entire layout in the manufactur-

ing area is composed of 15 rows of the duct each 166 feet in length. One additional row is 48 feet in length. The rows are spaced on 15-foot centers and run the entire width of the building, which is of glass and steel construction.

Because two high monitor bays run the full length of the building the duct was mounted on messenger cable. This cable is supported by long J bolts where it crosses the high monitors and short ones where it crosses low bay areas. All bolt supports are mounted to the roof steel by C clamps. The messenger cable was dead ended to the steel roof purlin nearest the side of the building by special clamps designed for the job. This was necessary because the glass windows came up to the roof steel at the building sides and prohibited mounting to the building walls. Cable clamps were supplied by the duct manufacturer to mount the duct to the messenger cable.



RADIO SPECIALIST R. J. Knoblock, estimator and engineer of Krouse & Heil, Inc., electrical contractors of Syracuse, N. Y., is shown studying the plans of a new frequency modulated transmitting station for one of the local radio stations. This company has made the installations in most of the major radio stations in central New York.

The feeds to the lighting duct were two No. 6 rubber covered wires in 1-inch flexible conduit extending from a 60 ampere, two pole, fused "swing out" plug mounted on the power duct to a connection box on the lighting duct. Each row of Trol-E-Duct had a separate feeder.

The complete installation was made from "A" and extension type ladders on the back fill before the concrete floor was laid.

The following is the material and labor data compiled by the contractor making the installation.

MATERIAL INSTALLED

2550 feet— $\frac{3}{8}$ -in. galvanized steel messenger cable (fifteen 166-ft. runs, one 48-ft. run)
32 —fabricated steel dead end clamps
80 —J hangers made of $\frac{1}{2}$ -in. bolt rod and in various long and short lengths.
2540 feet—50-ampere, two pole Trol-E-Duct
80 feet—1-inch flexible conduit (sixteen 5-foot lengths)
180 feet—No. 6 rubber covered wire

LABOR NECESSARY TO INSTALL THE ABOVE MATERIAL

DELIVERY AND DISTRIBUTION—includes receiving and checking delivery and distributing the duct preparatory to installation.

Total time 4 m. h.

FABRICATING CABLE SUPPORTS—includes measuring, cutting, bending, threading and assembling 80 J bolt supports and 32 dead end clamps.

Total time (supports) 10 m. h.

Average time per support 0.125 m. h.

Total time (clamps) 21 m. h.

Average time per clamp 0.656 m. h.

INSTALLING MESSENGER CABLE—includes measuring, cutting, and installing fifteen 166-ft. and one 48-ft. runs of $\frac{3}{8}$ -inch cable with dead end clamps and supports.

Total time 84 m. h.

Average time per run 5.25 m. h.

Average time per foot 0.0329 m. h.

MOUNTING THE DUCT—includes assembling and mounting fifteen 166-ft. and one 48-ft. runs of 50-ampere two pole Trol-E-Duct on the messenger cable. Assembly includes all necessary duct couplings, trolley entrance couplings and feeder tap-in boxes.

Total time 40 m. h.

Average time per ft. 0.0158 m. h.

INSTALLING FEEDER TAPS—includes mounting sixteen 60-ampere, two pole, fused "swing out" plugs on the power duct.

Total time 4 m. h.

Average time per tap 0.25 m. h.

INSTALLING DUCT FEEDS—includes measuring, cutting and installing approximately five feet of 1-inch flexible conduit with two No. 6 rubber covered wires from the power duct tap to the lighting duct junction box.

Total time 20 m. h.

Average time per feeder 1.25 m. h.

NEW! 5° ANGLE COUPLINGS



ORANGE STRIPE
PLAINLY MARKS
THE INSIDE RADIUS

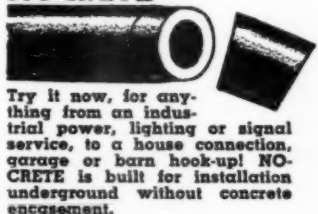
ORANGEBURG *perfects* another SAYING IN INSTALLATION COSTS

NOW you can avoid obstacles, and make bends, swings and offsets of varying size . . . on the job . . . in the field. . . get absolutely water-tight ORANGEBURG "quality" joints . . . at a fraction of the cost of special bends or ells . . . with the new, simple, inexpensive Orangeburg 5° Angle Coupling. (Available as stock items, either Orangeburg Standard or Nocrete).

. . . at only double the regular (straight) coupling price.

• Now by providing a relatively small number of the New "Orangeburg" 5° Angle Couplings to go out "on the job", the man in the field can meet conditions as they arise

NOCRETE



Try it now, for anything from an industrial power, lighting or signal service, to a house connection, garage or barn hook-up! NOCRETE is built for installation underground without concrete encasement.

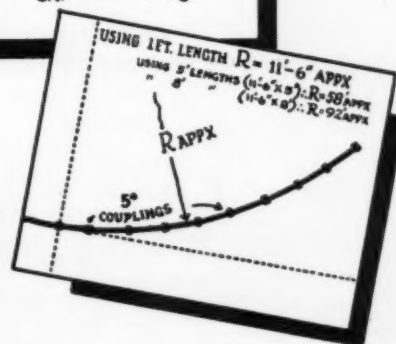
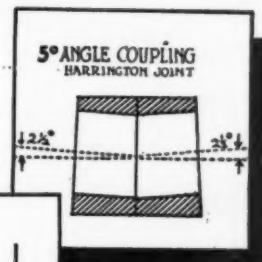
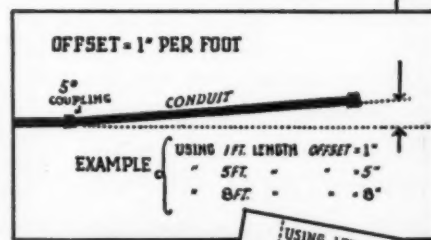
STANDARD



For a duct-bank job, a downtown or heavy-traffic location, use Orangeburg Standard installed with concrete encasement, and your profit margin will be assured.

without loss of time and still maintain highest quality standards.

• The 5° Angle Couplings are plainly marked with an orange stripe on the inside radius, thereby avoiding confusion with regular straight couplings and also indicating the "cock" of the 5° Angle at a glance.



Sales Agents—Distributors

GRAYBAR ELECTRIC COMPANY, INC.
GENERAL ELECTRIC SUPPLY CORP.

MADE AT ORANGEBURG, NEW YORK
BY THE FIBRE CONDUIT COMPANY
292 MADISON AVE., NEW YORK CITY

ORANGEBURG Standard for installation with concrete encasement
NOCRETE for installation without concrete encasement

CRESCENT

GENUINE

A.B.C.

Armored Bushed Cable

1. CONDUCTOR—flame retarding, printed showing size type of insulation and voltage.
2. BUSHING—easy to insert as paper un-wraps from under both ends of armor to make room for the bushing.
3. STEEL ARMOR—low resistance, electro-galvanized giving longest life.
4. Thoroughly tested at several points during manufacture and receiving a final test of 2000 volts between conductors and armor.
5. CRESCENT has unexcelled facilities for the complete manufacture of Armored Bushed Cable in all its steps. When you buy CRESCENT A.B.C. ARMORED BUSHED CABLE you buy the best. Do not be satisfied with any substitute.



CRESCENT

INSULATED WIRE & CABLE CO. INC.

TRENTON, NEW JERSEY

Atlanta	Baltimore	Boston	Buffalo	Chicago	Cincinnati	Cleveland
Detroit	Indianapolis	Kansas City	Los Angeles	Minneapolis	San Francisco	
New Orleans	New York	Philadelphia	Pittsburgh	St. Louis		

CRESCENT ENDURITE SUPER - AGING INSULATION

Estimating

[FROM PAGE 48]

The above data is applicable to this particular installation. Job conditions may vary on other installations and this is given only as a guide.

The man hour data listed here includes supervisory labor.

Data from Garden Electric Co., Inc., Elizabeth, N. J.

REPAIRING

DEAD-END CONDUITS

The electrical contracting firm of L. W. Kieswetter, Rochester, N. Y., was called in to remedy an unusual condition in one of the larger buildings in that city.

When the building was constructed a large number of conduits were left dead-ended in the ceiling slabs, without entering outlet boxes. It was their job to locate these conduit ends and extend them to their respective outlets.

Compressed air was used to force water into the conduits. After a definite time damp spots appeared on the ceiling plaster. Channels were cut in the plaster from these points to the outlet boxes and the conduit extended. This procedure was used for about 40 outlets.

The labor necessary to locate the conduits and do the necessary channeling was recorded by the contractor and is listed below.

WATER TEST AND CHANNELING—includes forcing water by compressed air into 40 conduits to locate the dead ends and channeling from this point to the outlet box.

Total time 160 m. h.

The above data includes the supervisory labor necessary to do the job.

GLIMPSES OF OURSELVES



Buckeye Conduit is made of Steel, Lacquer and Loyalty

The most important element in conduit that will help you on the job is the *men who make it*.

Buckeye Conduit is made in the largest and most modern conduit mill in the country. We're proud of that but we're a lot more proud of the men in those mills. Conduit making is still an art, and while these men of ours are as big and tough as they come, they're artists at their jobs. You'd know in a minute what we mean if you could see how skillfully the welder proceeds with his work only when the steel is heated within the narrow limits that mean perfect welding temperatures, and the pride he takes in every length he forms; if you could see the painstaking care of the men in the cleaning, baking and finishing divisions; and finally the sharp eyes of the inspectors who ruthlessly throw out any length that is not as perfect as it can be made.

These men -- many of them here for 20 to 30 years-- are as proud of their product as any painter could be of his work. You couldn't hire them to turn out a length of Buckeye that wasn't a tribute to their loyalty and skill. It is men like these at Youngstown that make us in the sales department proud to offer you the fine conduit they produce.

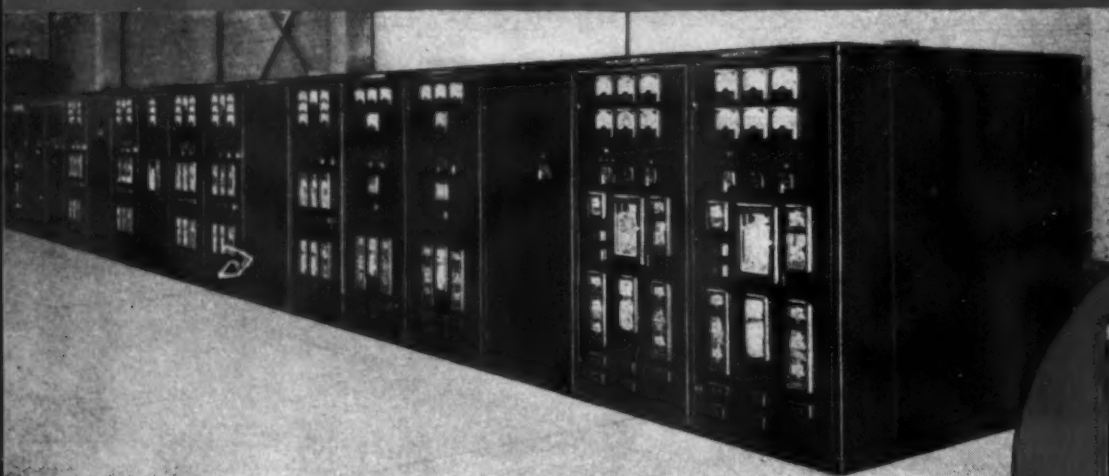


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THE
YOUNGSTOWN
SHEET AND TUBE COMPANY

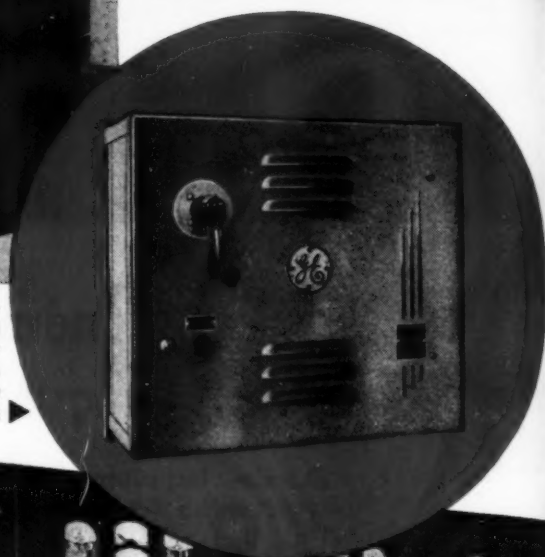
Manufacturers of Carbon and Alloy Steels
General Offices - YOUNGSTOWN, OHIO

LOOK to Your

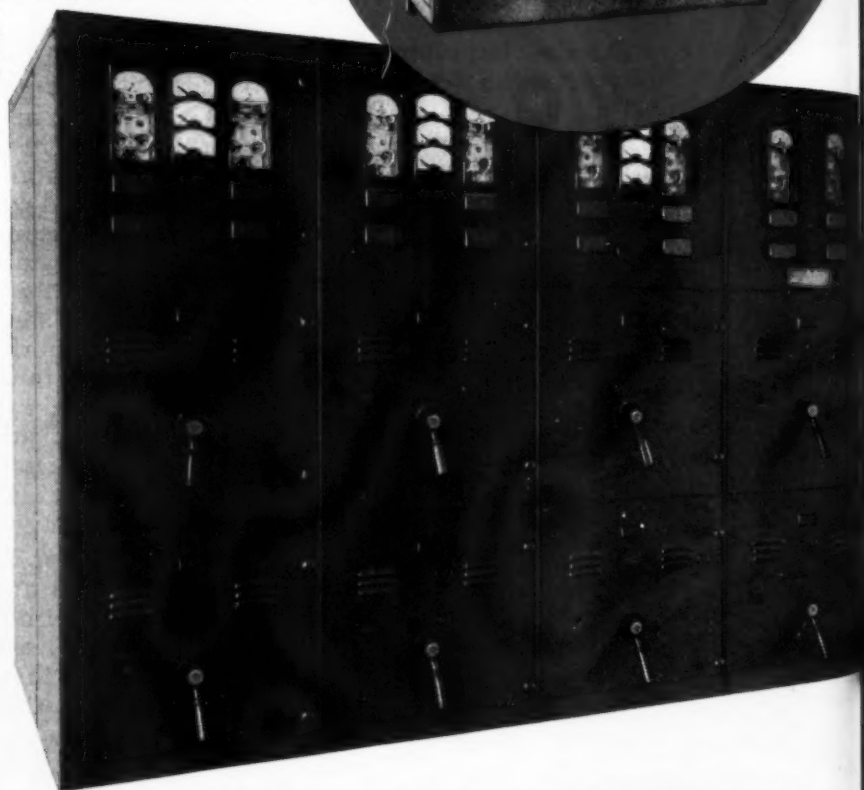


▲ **MASTER METAL-CLAD.** For control and protection of circuits up to 15,000 volts, 500,000 kva—generators, transformers, motors, synchronous condensers, incoming lines, feeders. Completely metal-enclosed. Built and shipped as a unit—practically ready for operation—saving time of piecemeal buying and most of installation cost. Features: easily removable breakers, stationary housing, mechanical interlocks, self-contained control. Completely coordinated equipment, designed to meet today's heavy production demands.

AIR CIRCUIT BREAKERS. To protect low-voltage power-distribution circuits—up to 600 volts, 80,000 amperes interrupting rating. Needed practically everywhere power is used, to open and close circuits, for automatic interruption in case of trouble, and to restore service (a turn of the handle does it). G-E breakers have ample capacity to interrupt heavy short circuits. Trip-free operation provides for safety. Arc quencher assures positive, safe interruption by completely breaking up and confining arc. Now helping to prevent production delays in many plants.



▲ **MIDGET METAL-CLAD.** For general power and lighting service in industrial plants and commercial buildings, to control and protect incoming lines, power feeders, and motor circuits—600 to 5000 volts, 25,000 and 50,000 kva interrupting rating. Features: completely metal-enclosed for safety; removable breakers—easy maintenance; factory-built and shipped assembled—a tested, finished job with low (predictable) installation cost; liberal insulation; coordinated circuit components; mechanical interlocks; self-contained control. Prices have been drastically reduced.



▲ **METAL-ENCLOSED SWITCHBOARDS WITH DRAWOUT AIR BREAKERS.** Combine features of metal-enclosed switchgear and dependability of G-E air circuit breakers. For power and lighting service—low-voltage feeders up to 10,000 amperes at 600 volts a-c and 250 volts d-c interrupting ratings to 80,000 amperes. Completely accessible. Have mechanical interlocks and silver-to-silver current-exchange connections. Service quickly restored by turn of breaker handle. Interchangeable breakers enable production to continue during routine inspection.

**ALL YOUR POWER GOES THROUGH YOUR SWITCHGEAR
—DON'T LET IT BE THE PRODUCTION BOTTLENECK**

SWITCHGEAR

In Planning for Increased Production

SPEED! That's the keynote of emergency production. Even brief shutdowns can be mighty costly in lost time and product spoilage. Your men and machines *must* be kept on the job.

Generators, motors, power lines, branch feeders—all of your electric equipment—have to be adequately controlled and protected to keep your plant operating at top capacity. With modern *dependable* switchgear you can be more certain of continuous operation. Today's requirements demand switchgear that will operate reliably, require less maintenance, and occupy less space than ever before.

Protect Your Production

Modern G-E switchgear is one of the best types of production insurance you can buy. You need the complete circuit protection which it gives even under the most severe conditions. You need switchgear that will get circuits back into service in the shortest possible time after outages due to short circuits and overloads.

Get Your Order in Early

Avoid the penalty exacted by obsolete switching equipment—the penalty which you pay in the form of lagging production schedules, and in hazards to operators and property. It will pay you—in profits and in peace of mind—to bring your switchgear up-to-date. Act today!

HAVE A CHECKUP MADE NOW

Why gamble with obsolete switchgear? If your equipment is 15 or 20 years old, the actual protection it affords may be less than you suspect. It may subject your operations to penalties—delayed production, hazards to machinery and personnel—that can undermine the profits of the most efficiently run production department.

Have your G-E representative put you in touch with a switchgear specialist. He will be glad to assist you in studying the needs of your plant. His recommendations will be based on sound engineering principles and he will help you to select the best type of equipment for your specific requirements. Call the nearest G-E Office today.

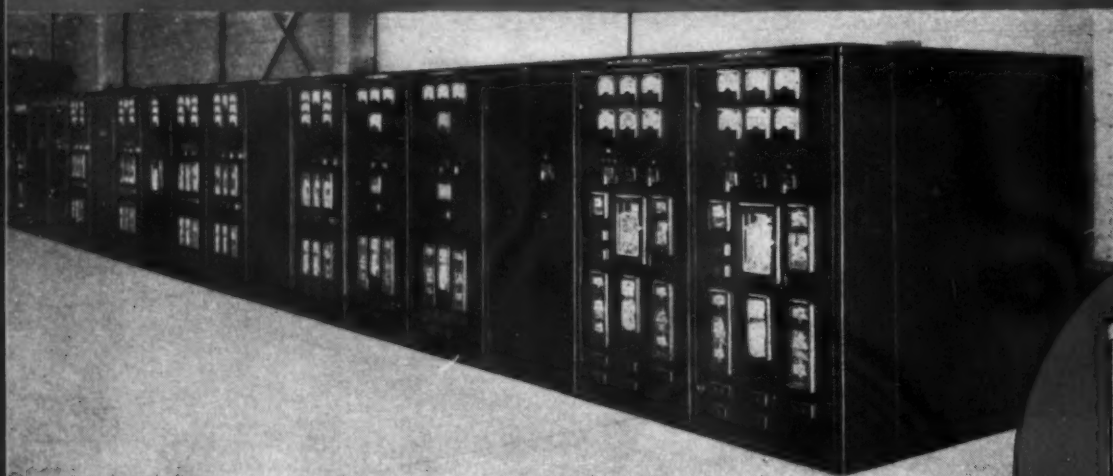
General Electric, Schenectady, N. Y.



GENERAL ELECTRIC

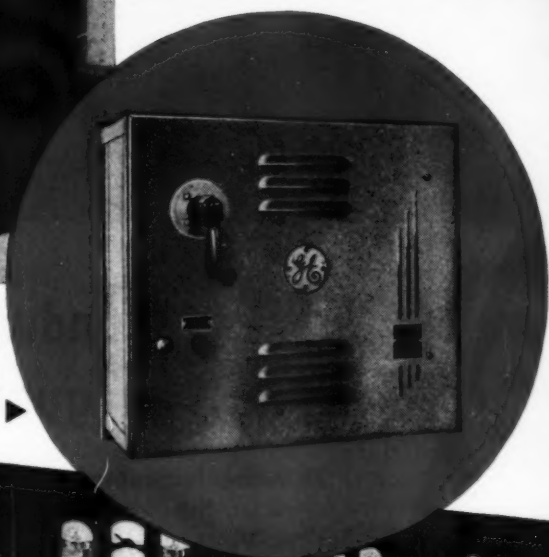
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LOOK to Your

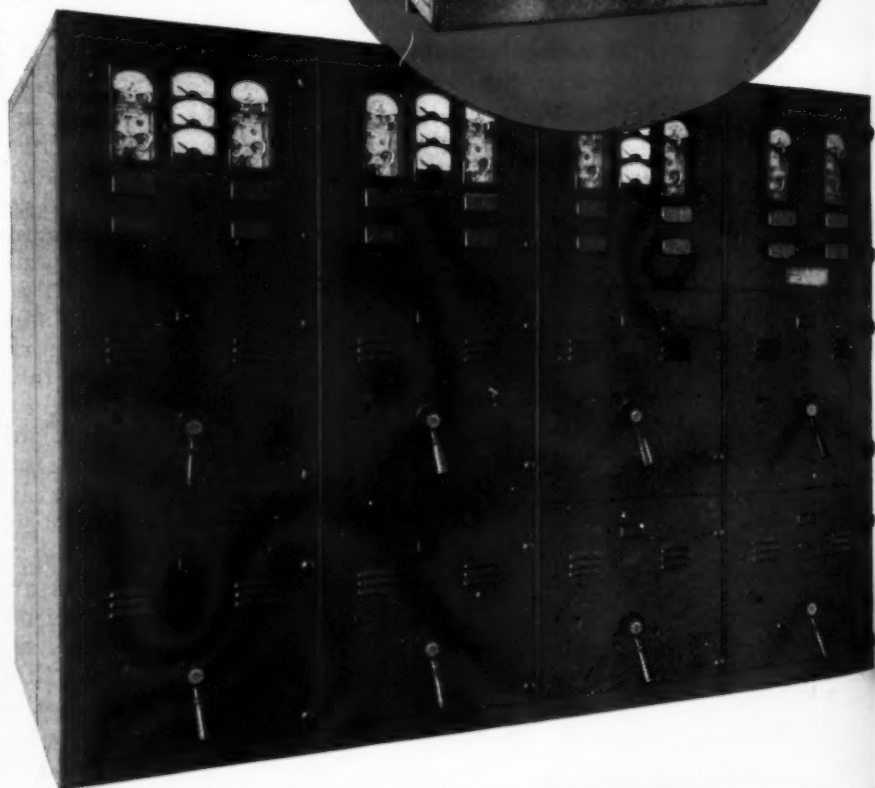


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General Electric, Schenectady, N. Y.



GENERAL  ELECTRIC

855-1

Questions ON THE Code

Answered by
F. N. M. SQUIRES

Chief Inspector New York Board of Fire Underwriters

Protection Against Single Phasing

Q. "What provisions are recommended to protect against single phase operation of fractional motors or lights where 230-volt, 3-phase 4-wire distribution is installed?" V.A.L.

A. Where automatically controlled fractional horsepower motors of $\frac{1}{8}$ th to 1 hp. are concerned, the Code requires running protection at not over 140 per cent of the motor rating or protection by means of an inherent overheating protective device. Either of these methods will provide protection in case of single phasing.

In the case of manually controlled motors of the above type it is expected that the motors would be in sight and that the operator would notice that the motor was not running and therefore throw the switch off, or it is expected that some one would notice the motor smoking and then throw the switch off. If they are out of sight of the operator they must have the same protection as is required for automatically started motors.

These, manually operated motors, may have small running currents and quite often are not protected by the 15 ampere fuse on which the Code permits them to be used.

Wattage Load

Q. "On page 45 of the May issue, you answer a question as follows: 'The safe carrying capacity of a No. 14 and also the maximum permissible load on a 15 ampere branch lighting circuit is 15 amperes. 15 amperes multiplied by 110 volts equals 1650 watts, which is the answer.'"

"When we read the above answer we remembered that Section 2108, Article 210, says 'Where circuits supply continuous loads such as store lighting and

similar loads, the load shall not exceed 80 per cent of the branch circuit rating.' It would certainly be of interest to have your opinion as to the application of Section 2108 to the answer published in your magazine."—M.G.E.

A. The question, which was the basis of our answer asked how many watts a No. 14 wire would safely carry. Section 3005, paragraph A, states, "Table 1 in Chapter 9 gives the allowable continuous carrying capacity of copper wire." In Table 1 the capacity of No. 14 wire is 15 amps. and 15 times 110 volts equals 1650 watts. However when we are dealing with a branch circuit and connecting a continuous load to it, as in a store, the last sentence of Section 2108 restricts us to 80 per cent of the branch circuit rating.



SYSTEM CHANGEOVER work is a specialty of Frank E. Emerson, shown standing near a 3000-ampere, 250-volt, three phase entrance breaker he installed in a large Buffalo bank building where he is changing the system to operate on 60 cycle current instead of the present 25 cycle. "Doc" is an engineer for the Sterns Electrical Equipment Co., of Buffalo and has done much of the 60 cycle changeover work in Buffalo buildings. He handles everything from service entrance through and including the new equipment.

Lead Covered Wire

Q. "In the September issue, 1938, of *Electrical Contracting* on Code questions there is a question on lead duplex underground. You state that the Code requires that lead duplex installed underground shall be in conduit. I thoroughly agree with you but I cannot find the reference in the Code which definitely states that it shall be in conduit, duct, etc. Will you please advise me of that reference."—L.R.T.

A. Section 1101 of the Code covering "Wiring Methods" says that "only wiring methods recognized as suitable are included in this Code."

Sections 3030 to 3040 cover Raceway Systems and it will be noted that in the definition of "Raceways" lead covered wire is not included as a raceway.

Sections 3051-3054 cover "Wiring in Metal Enclosures" and it will be noted that lead covered wire is not included.

Then follows Service Articles from 320 to 364 in the Code, and in none of these is there included any provision for the installation of plain lead covered wires as a recognized method of wiring.

Therefore as there are no rules permitting the use of plain lead covered wiring installed underground such a method is not approved under the Code.

Fluorescent Fixtures

Q. "Is there anything in the Code regarding the fixtures used for the fluorescent lamps?"

"The present fixtures are made of heavy gauge sheet steel pressed to shape but I was wondering if there was anything in the Code that would stop one from making a fixture of insulating material when used in dry places."—F.H.

A. Fixtures of all types are covered in Article 410 and Sections 104100 and 104101 of Chapter 10, of the Code. Fluorescent fixtures come under these rules.

Section 104100 states that, "fixtures shall be made of metal, wood or other approved material" and Section 104101 requires that "in all fixtures not made entirely of metal, wireways shall be lined with metal" except that this is not required with raceways in glass, marble or similar non-absorptive insulating materials.

Some inspection bureaus are approving only such fixtures as are labelled by Underwriters' Laboratories and many more are applying this requirement quite rigidly to fluorescent fixtures. The trend is rapidly growing toward labelled fixtures and this should be encouraged.

Electrical Contracting, August 1940

FLAMENOL*

SMALL DIAMETER BUILDING WIRE

IS APPROVED

BY THE UNDERWRITERS' LABORATORIES



Flamenol Small Diameter Building Wire, Type SN, insulated with plasticized polyvinyl chloride compound, is approved in all sizes from No. 14 to 4/0 inclusive. (Label Service—Guide Card 400—119Y—File E13268)

FLAMENOL HAS MANY ADVANTAGES

1. Existing buildings can be rewired inexpensively with this wire because new raceways aren't necessary. Simply replace existing wires in raceways with Flamenol.
2. Flamenol Small Diameter Building Wire is easy to handle. It has a smooth, glossy wax finish. It is easy to strip and to pull. Moreover, this wire is available in many bright, clear colors which make circuit identification and testing easy.
3. Flamenol Small Diameter Building Wire can be depended upon to give good service. Its insulation is superaging, high in dielectric and mechanical strength, flame retarding and resistant to moisture, oil, acids, etc.

For further information or samples, see the nearest G-E Merchandise Distributor or mail the coupon at right.

*Reg. U. S. Pat. Off.

GENERAL  ELECTRIC

COMPARISON OF WIRE DIMENSIONS

Size AWG	Approximate Over-all Diameter (In.)		Area in Square Inches	
	Rubber-covered Type R	Flamenol— Type SN	Rubber-covered Type R	Flamenol— Type SN
14 Sol.	.19	.130	.025	.0133
12 Sol.	.21	.147	.035	.0170
10 Sol.	.23	.168	.042	.0220
8 Sol.	.28	.227	.062	.0405
6 Strd.	.41	.314	.13	.0775
4 Strd.	.45	.363	.16	.1035
2 Strd.	.52	.423	.21	.1405
1 Strd.	.59	.496	.27	.1935
1/0 Strd.	.63	.537	.31	.226
2/0 Strd.	.67	.582	.35	.267
3/0 Strd.	.72	.634	.41	.316
4/0 Strd.	.78	.692	.45	.376

General Electric Company
Section WF-0128
Appliance and Merchandise Department
Bridgeport, Connecticut

Sirs: Please send me

- ☐ Information on Flamenol Building Wire
☐ Samples of Flamenol Building Wire

Name.....

Address.....

City..... State.....

Bell Signal Systems

Q. "Our inspector has taken the stand that the installation of No. 18 wire, not rubber covered, operating several signal bells in a cabinet with 110-V. light circuits is a radical violation of the Code and involves fire hazard.

"The case happens to be where there are six bell circuits in a metal cabinet having a wood door, all attached to a 12-V. transformer, which is in the same cabinet and protected on the primary side with 20 amp. fuses. There is also in this cabinet six 110-V. branch line lighting circuits with 30 amp. fuses protecting No. 14 wire. These branch line circuits are knob and tube after leaving the cabinet. The bell signal circuits are in direct contact with the 110-V. circuits, both in the cabinet and after they leave same for a considerable distance, up through a room where there is a miscellaneous storage, making both light and bell wires, which are not enclosed in any way, subject to mechanical injury from miscellaneous storage in such room.

"These several serious violations of the Code are in an ordinary brick building with wood joisted floors and roof. Will you please be kind enough to express your opinion concerning this radical disregard of the Code, particularly in not keeping the wires of signal systems, including open wiring, properly separated from power and light circuits. The contention is that there is no hazard present, while the inspector insists on the direct opposite and that there should be ample penalty for this violation."—A.G.P.

A. There is no question about the condition mentioned being a very serious fire hazard. Such conditions have been looked upon for years by Inspection Departments and by the Code makers as such hazards.

Section 3013 says that conductors of different systems shall not occupy the same raceway, enclosure, cable armor, outlet box, fitting junction box, cutout box or cabinet unless a barrier is interposed between the wires of the different systems and under Definitions in Article 100 it is shown that bell wires receiving their current from 12 volt transformers are of a different system than the 110-volt lighting wires.

Also paragraph B of Section 8012 requires that conductors of signal (bell) circuit, shall be separated from conductors of electric light and power wires.

Therefore the installation described is in violation of the requirements of the National Electrical Code.

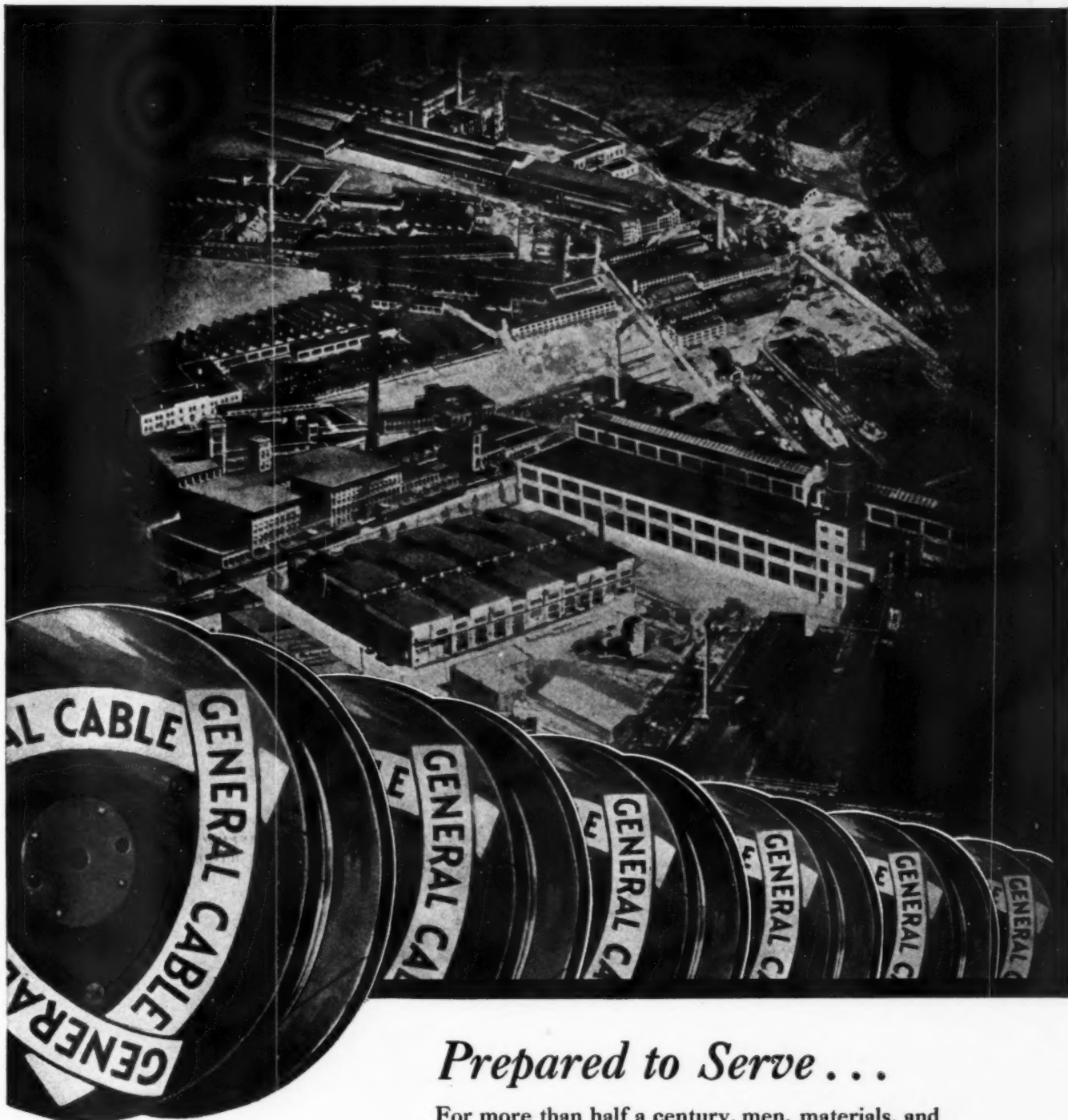


*Connect with Burndy
in tight Spots*

When you come up against tight spots in making connections there is no use beefing . . . the job must be done. Why not make the job easier by selecting Burndy Connectors. The type QPR shown here is only one of the many Burndy Connectors designed to reduce inconvenience where connectors are difficult to install.

BURNDY
Guttertap

SEE YOUR WHOLESALE FOR DETAILS ON THIS ITEM



Prepared to Serve . . .

For more than half a century, men, materials, and machines have been combined to make General Cable a principal source of supply for electrical wires and cables. . . . Multiple plants, enormous production capacity, and skilled men are prepared for greater responsibilities.

GENERAL CABLE

BARE and INSULATED WIRES and CABLES for EVERY ELECTRICAL PURPOSE

Stocked by Electrical Wholesalers Everywhere

General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT
KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N.Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D.C.)

In the News

NECA Fights for Government Contracts

The National Electrical Contractors Association has taken important action to protect the electrical contractor in the contracts which the government is about to place for electrical construction involved in the preparedness program.

The National Defense Acts prohibit the "cost-plus-a-percentage-of-profit" but permit the use of a cost-plus-a-fixed-fee form of contract, when deemed necessary by either the Secretary of the Navy or Secretary of War. The fixed fee to be paid a contractor under this authority is not to exceed seven per cent of the estimated cost of the contract without the fee. The effect of this has been that the general contractor in order to secure the largest possible profit is building up specialized departments to handle electrical construction, heating, air conditioning and plumbing. This despite the fact that the use of unskilled men and unskilled management run up the cost.

Realizing that this is not in the public interest and would destroy the opportunity of the specialized contractors to render their service in the present emergency, President R. W. McChesney and General Manager Laurence W. Davis of NECA called in representatives of the Heating, Piping and Air Conditioning Contractors and Master Plumbers and presented the situation to various officials in Washington. The result was that they were requested to present a brief and recommend an executive order to be signed by the President to insure that the specialized contractors would be recognized and utilized where their services are required. The following brief was submitted to the Secretary of Commerce:

"1. Practically all construction contracts, both public and private, performed by General Contractors make use of specialized contractors for the special trades, such as electrical work, plumbing, heating, piping, air conditioning, painting, steel erection, etc. This is done because:

(a) Cost is a considerable factor and the specialized contractor, with his skilled organization, can and does do such work more economically than the general contractor can.

(b) Time of completion is equally important. The specialized contractor can and does do specialized construction much quicker than the general contractor can.

(c) Quality of work is another essential. Established specialized organizations of electrical, plumbing, heating, piping, air conditioning, painting and steel erecting contractors can do better work than inexperienced organizations hastily assembled.

"2. The Emergency Navy construction work (not including shipbuilding) has not resulted in the award by the principal contractors of a specialized contract in any of the trades just mentioned, so far as we know. If the War Department construction contracts are

awarded on a similar basis, we anticipate that few, if any, specialized contracts will be let, because:

(a) The Navy contracts have been let on cost-plus-a-fixed-fee basis with no provisions requiring the contractors to make use of established specialized contractors for those portions of the work which they are not qualified or organized to perform.

(b) The costs will be paid by the United States, and experience with World War and Emergency Fleet Corporation contracts show that no strict regard is had for costs under a system which does not limit final costs to the Government.

(c) The Navy Construction contracts stipulate the payment of cost-plus-a-fixed-fee to the principal contractors. It is understood that similar stipulations will be contained in the War Department construction contracts. These contracts make no provision for paying a fee or profit to specialized contractors who are not parties to the contract with the United States. Specialized contractors cannot do the work for their costs alone.

(d) To avoid dividing their fee with specialized contractors, the parties to the contract may organize their own specialized departments or subsidiaries to do the electrical, plumbing, heating, piping, air conditioning, painting, steel erection and other specialized work, even though the work so done will be more expensive to the United States and slower than if done by specialized contractors.

(e) It is not enough for Government officials to express a pious wish or hope—as some of them have done—that specialized contractors be engaged by the contracting parties to perform specialized work. The contracting procedure, including the forms of contracts, must be such as to make provision therefor. A definition of "costs" must be contained in the Government contracts which will include a profit or fixed fee to the specialized contractor. Contractors should be prohibited by the terms of the contracts from performing specialized construction work unless they have been engaged in performing such specialized work for a reasonable period of not less



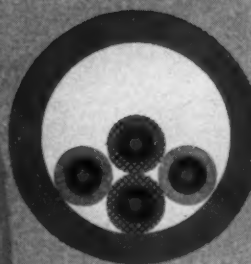
"I'm having Sterilamps installed at each table, Boss—I'm not so sure about the hash."

WUXTRY! WUXTRY!

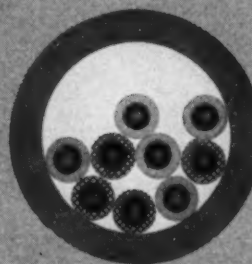
Underwriters **LABEL** Laytex!
Again Wire History is Made!

NEWS F-L-A-S-H!

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Announce Type RU,
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Small Diameter Building Wire
Receives Underwriters'
Label Service!



Conventional insulated wire, four
No. 14 (code) type
R conductors...
3450 watts.



Laytex insulated wire, nine
No. 14 Laytex
insulated conductors...7250 watts.

*You cannot buy a smaller diameter
wire than U. S. Laytex DILEC.*

UNITED STATES
ROCKEFELLER CENTER



RUBBER COMPANY
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U. S. **Laytex** IS RUBBER INSULATION AT ITS BEST

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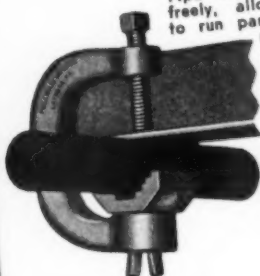
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No. 284 Duplex Receptacle Nozzle



With 1/2" brass pipe extension. Neatest and most compact fitting obtainable. Also available with 3/4" pipe extension. Fullman also offers Duplex Telephone Nozzles.

No. 470 Pipe or Conduit Hanger



Pipe support turns freely, allowing pipe to run parallel or at right angles to beam. Does away with drilling or use of straps. Handles 1/4", 3/8" and 1/2" size pipe, to steel beams 3/8" thick.

No. 330 "Latrobe" Tom Thumb Utility Outlet



To be used in wood installations and other locations free from moisture or mechanical injury.

• The Latrobe Line is complete for all residential, commercial, and industrial requirements. In addition, the entire line is designed with the idea of reducing installation time . . . an important point to consider when selecting floor boxes and wiring specialties

Write for details TODAY!
FULLMAN MFG. CO.
LATROBE • PENNA.

In the News

[FROM PAGE 58]

two years prior to the date of their negotiated contract with the United States. This will prevent contractors from attempting to either do the specialized work through a temporary force organized for a particular project or through subsidiary corporations organized for that purpose.

"We recognize that it is essential to the prompt execution of the present National Defense construction program that the cost-plus-a-fixed-fee form of contract be used to avoid long delays arising from the preparation of definite and detailed plans and specifications necessary for competitive lump sum bidding.

"We are concerned, however, with the developments which are growing out of the use of this cost-plus-a-fixed-fee form of contract under which no provisions have been made for the employment of the highly developed and experienced organizations of our specialized contracting concerns, and instead the system of a fixed fee for the principal contractors is ignoring the greater efficiency and economy in the employment of the specialized contractor and is encouraging the principal contractors setting up hastily organized departments of their own to handle this work at greatly increased cost to the Government and lesser efficiency, but thereby retaining for themselves the full amount of the fee.

"We, whose names are signed below, as officers of our national associations representing over thirty thousand employers, employing over three hundred and fifty thousand employees in our respective fields, located in practically every city and town in every State in the Union, request and expect that the policy governing the cost-plus-a-fixed-fee contract to the principal contractors be amended to provide that the highly specialized contractors we represent shall be employed, and we recommend that prequalification of any concern for consideration for any specialized work shall require that such concern shall have been engaged in that special type of work for at least two years, and have a performance record, organization and resources compatible with the work to be performed."

To facilitate the carrying out of this purpose, the following suggested form of executive order was recommended:

"The term 'cost' as used in the statutes authorizing construction contracts to be entered into by any agency of the Government on cost-plus-a-fixed-fee basis shall be interpreted in the contracts to include a reasonable profit or fee to specialized contractors who may be engaged to perform any specialized work, including electrical, plumbing, heating, piping, and air conditioning work.

"Under such cost-plus-a-fixed-fee contracts the contracting parties shall not permit any contractor to itself perform or have performed any specialized work, including electrical, plumbing, heating, piping or air conditioning work unless such contractor or specialized contractor shall have been engaged in that special type

of work for at least two years and shall have a performance record, organization and resources compatible with the work to be performed."

ADEQUATE WIRING MARCHES ON

The National Adequate Wiring Bureau's program to disseminate better wiring to the home owners of the nation continues to move forward. More local bureaus are receiving certification licenses, more new homes are being certified and more outlets are being installed in existing residences. Here are the latest developments.

Hartford, Conn.—The Hartford Electric League became the thirty-eighth group to receive a certification license. The Hartford program will be operated in the city of Hartford, East Hartford, West Hartford, Wethersfield, Rocky Hill, Windsor, Bloomfield, Granby, East Granby and Tariffville—all in Hartford County.

Roanoke, Va.—The thirty-ninth license to operate the certification plan has been issued to the Adequate Wiring Bureau of Roanoke. The plan will be operated in the city and county of Roanoke.

Jacksonville, Fla.—The Jacksonville Adequate Wiring Committee is the fortieth group to receive the certification license from the National Bureau. The local plan will operate in the city of Jacksonville and certain portions of Clay, Duval, Nassau and St. John's counties in Florida.

Charlotte, N. C.—Results of the work of the local A/W bureau is reflected in the report of a leading electrical contractor that the number of outlets called for in new homes has increased from 20 to 40 per cent in the past year. The Charlotte group is sending a summary of a recently conducted survey of 26 occupants of A/W homes to local electrical contractors and builders.



TRAIL BLAZER Charles D. Stempfle, president of Stempfle Electric Co., Elmira, N. Y., has blazed a trail of fluorescent light in the city of Elmira. Most of "Charley's" customers, ranging from tobacco shop to large department stores, now have some form of fluorescent light to brighten up their stores. C. D. is not content with only selling this new light source, but in his spare time he designs fixtures to apply fluorescent lighting to his customers specific needs.



DEFENSE ECONOMY will make heavy demands on all of us. New industries must be created—old ones must be revamped—to produce a new and varied line of products. To meet these demands, power and light distribution in every plant must be as perfect as possible. Wiring systems must be modernized so that production may not be impeded. Efficient and dependable busducts—switchboards—panelboards—safety switches—and other electrical equipment will be required for this purpose.

Ⓐ Products are in a strong position to meet these requirements. Nearly fifty years of development and production assure you of equipment *made better than necessary*. In these products, moderate first cost is combined with low upkeep. In new and modernized plants, these Ⓐ products will serve faithfully and well:

Feeder Busducts . . . Plugin Busducts . . . Shutlbrak Safety Switches . . . Power and Light Distribution Panelboards (Standard and Column Types) . . . Klampswitchfuz Narrow Distribution Panelboards (for floor and wall mounting) . . . and many others.

Ⓐ BUSDUCTS—

THE MODERN, COMPACT, FLEXIBLE AND EFFICIENT METHOD FOR POWER AND LIGHT DISTRIBUTION

Ⓐ Busducts are ideal for this purpose. They consist of copper busbars, rigidly supported at 30-inch intervals with specially designed insulators that assure proper spacing (to meet requirements of the National Electrical Code)—all contained in enclosures of galvanized steel or aluminum. Contact surfaces of connecting bars are silver-plated to prevent oxidation.

All Ⓐ Busducts are made in standard 10-foot sections. Each section of the Plugin Type is arranged with nine plugin outlets on 12-inch centers; 2, 3 and 4 wire feeder systems; 250 volt DC, 575 volt AC, maximum.

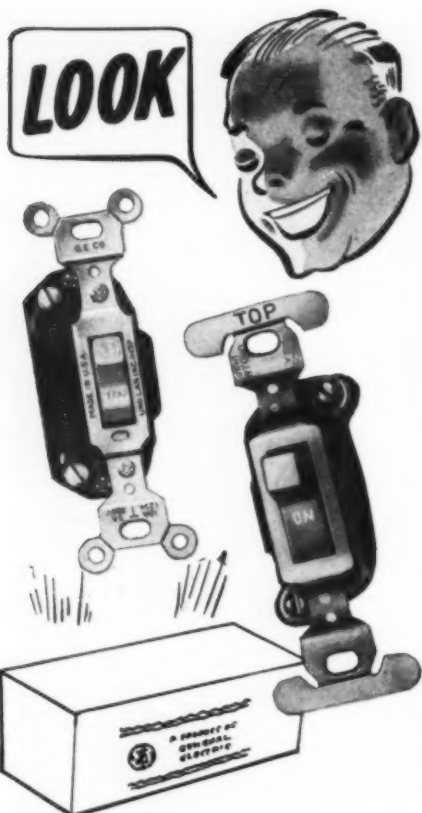
Ⓐ Busducts can be attached to either walls or ceilings. Flexibility of installation is provided by suitable elbows, tees, end boxes, intermediate feed-in and feed-out boxes—all adapted to fit required space or position. Future extensions may be made readily to existing installations.

With this convenient arrangement, machines may be set or moved at will, and plugged in at any required position without delay.

Ⓐ Sales-Engineers Can Help You With Your Distribution Problems

Their long experience and training are at your service—without obligation, of course. Write or wire for the name and address of the one nearest you. You'll find him ready to consult with you and help lighten your load. . . . Frank Adam Electric Company, St. Louis, Mo.





G-E OFFERS ANOTHER SWITCH PACKAGE

HERE is a new sales-provoking switch package, GE3314, containing a variety of ivory color and brown color Sphinx Mercury and standard switches—switches to interest all your customers—switches to fill every requirement. An action display is included in the package and sales promotional material is available.

The original G-E switch package, GE3316, which has proved so popular, is also still available. It contains brown color Sphinx Mercury switches, standard switches and an action display.

Both of these packages will help you to sell adequate switch control on your jobs. For more information about them, see the nearest G-E Merchandise Distributor or mail the coupon below.

MAIL
THE
COUPON



General Electric Company
Section D-0128
Appliance and Merchandise Dept.
Bridgeport, Connecticut

Name

Address

City State

GENERAL ELECTRIC

In the News

[FROM PAGE 40]

Dallas, Texas—The Simons-Graham Corp., a local operative builder, is planning 200 A/W homes in its Lakewood Estates Development. Range circuits in modern kitchens, scientific lighting and protective floodlighting for yard areas are included in these All-Electric homes.

San Antonio, Texas—Adequate wiring will be permanently featured and demonstrated in four operatively built homes in San Antonio. Each of four operative builders will equip one home with comfort cooling, light conditioning, planned kitchens and adequate wiring. All outlets will be clearly designated for the service which they provide. Visitors will be conducted by a tour method through each home.

COMING MEETINGS

International Association of Electrical Inspectors—Southwestern Section, Santa Barbara, Calif., August 26-30. Northwestern Section, Great Falls, Mont., Sept. 3-6. Southern Section, Houston, Texas, Sept. 16-20. Western Section, Kansas City, Mo., Sept. 23-27; Eastern Section, New York, N. Y., Oct. 7-11.

National Electrical Contractors Assn.—Annual Convention, George Washington Hotel, Jacksonville, Fla., Oct. 21-23.

National Electrical Manufacturers Assn.—Annual Conference, Waldorf-Astoria Hotel, New York, N. Y., Oct. 27 to Nov. 1.

MINNESOTA CONTRACTORS FORECAST BUSINESS UPTURN

Code changes, state-wide adequate wiring promotion, national defense activity, closer industry cooperation and lighting progress in the presence of a general business upturn are adding up to bright prospects for the electrical contractor and dealer during the coming months. This was the conservatively optimistic outlook of leading North Central contractors at the annual summer meeting of the Minnesota Electrical Council and Association.

Meeting in Hibbing, Minn., July 19-21, 135 members and guests joined in the business and social program arranged by E. J. Micka of Hibbing. The convention sessions were preceded by the regular meeting of the Board of Directors of the Council.

The contractor dealer conference was opened by a welcome from E. J. Micka, president of the Minnesota Electrical Association. Sam Newstone, of Montevideo, president of the Minnesota Electrical Council reviewed the progress of the organization in membership and scope of activities. While reporting on the progress of the Council during the past year, Secretary-Manager Wm. A. Ritt urged better estimating on competitive work and more sales effort on non-competitive jobs.

Supply houses with the strictest credit policies are the best places to buy, David

R. Thomas, manager of the Western Credit Exchange, told the conference in a discussion of credit and credit policies.

C. M. Baldwin, sales promotion manager of the Minnesota Power and Light Company, urged closer industry cooperation, asking the contractors to be open minded toward utility sales programs.

Urging more creative salesmanship, Ted Losby, manager of the sales promotion department of the Northern States Power Company, stated that wiring must be sold as a complete job, not as a collection of labor and materials. The only alternative to salesmanship, he warned, is to reduce the business to dispensing labor only.

E. O. Day, inspector-engineer of the Mills Mutuals, presented a review of the 1940 revisions of the National Electrical Code.

W. T. Stuart, middle west editor of *Electrical Contracting*, speaking before the combined groups at the banquet, outlined the contractor's responsibility in the national defense program stressing particularly the need for accurate industrial wiring surveys now.

At the Sunday sales conference Arthur H. Brayton, manager of the Des Moines, Iowa, convention bureau, discussed the strategy of modern sales organization and salesmanship. W. C. Stephenson, field representative of the Modern Kitchen Bureau, outlined the fall promotion program of that organization.

The results to date of the Minnesota state-wide Adequate Wiring Campaign were reviewed in the closing session by A. H. Kessler of the North Central Associated Electrical Industries.

NEW LEAGUE DIRECTOR

The Electrical League of Indianapolis announces the appointment of Walter O. Zervas as its Managing Director.

Mr. Zervas was manager of the Electrical League of Milwaukee from 1928 to 1937 and since then was associated with George D. Munger in the Rural Electrification Administration.



THE PURKHISERS of Caldwell, Idaho—Clarence D., Clarence D. jr., and Herman, father and two sons all engaged in the Purkhiser Electric Co. of that city. C. D. senior is well known throughout Idaho as the president of the Electric Equipment Sales Association.

THESE MEN KNOW THERE IS A GOOD

3-Way Profit *



WEBSTER ELECTRIC
in Teletalk *Amplified*
REG. U.S. PAT. OFFICE  **Intercommunication**

This is a Model 224 Teletalk. It has a capacity up to 24 stations. Teletalk models ranging from simple five station systems to deluxe models with "busy signal," confidential handsets and other features are available to meet every intercommunication requirement.

*A Profit on
Teletalk, A Profit
on Labor, A Profit
on Materials* *

**Estimate What Your
Profit Would Be On
Jobs Like These . . .**

These electrical contractors **KNOW** there is a three-way profit in Teletalk. That's why they are selling Teletalk. That's why they are getting repeat business on Teletalk.

Teletalk can be installed by any qualified contractor. When you install Teletalk you make a three-way profit—a profit on the sale of Teletalk—a profit on the materials required—a profit on the labor.

Some contractor in your city is going to get the Teletalk business. It can be you. Start now by writing for full details.



J. N. Barkdull, Cleveland, installed a 10-station executive control Teletalk system at Pump Engineering Service Corporation—a division of Borg-Warner.

Henry Dormitzer, Boston, installed a seven-station Teletalk system in Carter, Rice & Co. The job required 225 man-hours. Dormitzer made a three-way profit!



Carl Gebbers sells Teletalk, displays Teletalk, and uses Teletalk in his own place of business. His jobs include the John Hamrick Theaters in Tacoma, Wash.

Harold Lloyd, New York, installed a 12-station Teletalk system for American Airlines which controls a multitude of operations in their buildings at La Guardia Airport.

Licensed by Electrical Research Products, Inc., under U. S. Patents of American Telephone and Telegraph Company and Western Electric Company, Incorporated
WEBSTER ELECTRIC COMPANY, Racine, Wis., U. S. A. Est. 1909. Exp. Dept.: 100 Varick St., N. Y. C. Cable Address: "ARLAB", New York City

Webster  Electric

"Where Quality is a Responsibility and Fair Dealing an Obligation"

MANUFACTURERS OF TELETALK INTERCOMMUNICATION AND PAGING SYSTEMS • POWER AMPLIFIERS AND SOUND DISTRIBUTION EQUIPMENT • RADIO PHONOGRAPH PICKUPS • IGNITION TRANSFORMERS AND FUEL UNITS FOR OIL BURNERS

NEW { FEATURES MODELS PRICES

A COMPLETE NEW LINE OF "AUTOMATIC" TIME SWITCHES

New Features . . .

Windows in all cabinets . . . Visible dial . . . Visible trip levers!

New "streamlined", gray, steel cabinets!

Motor-operation indicators!

Visible — Contact — Position inspection!

Optional "dead-front" terminal panel! Removable dial for easy setting of trip levers!

Interchangeable dials for one or two sets of trip levers!

Manual Control on all models; simple in design and operation!

Padlockable, tamper-proof cabinet hasps!

Synchronous, self-starting motors with normal operation down to 20 below zero!

New type trip levers . . . Bright for ON . . . Black for OFF!

Two portable, plug-in models with extension cord and receptacle requiring no installation!

Settings as close as 15 minutes between ON and OFF . . . With two sets of trip levers, next ON operation as close as 1 3/4 hours!

Sunday and Holiday Cutout standard on all 45-ampere models!

More compact size . . . more attractive appearance . . . Complete range from 7 to 45 amperes . . . Single-pole and double-pole models . . . One and two circuit types!

Here Are A Few NEW MODELS...NEW PRICES

45 Amperes...Double Pole...	\$20.00
45 Amperes...Single Pole....	\$18.00
30 Amperes...Double Pole...	\$15.00
30 Amperes...Single Pole....	\$13.00
20 Amperes...Single Pole....	\$12.00

Portable, Plug-In Models

10 Amperes...Single Pole....	\$11.50
7 Amperes...Single Pole....	\$10.50

Write For Information
AUTOMATIC
Electric Manufacturing Co.
MANKATO • MINNESOTA

In the News

[FROM PAGE 62]

BROWN BECOMES IBEW PRESIDENT

Edward J. Brown of Milwaukee has been elected president of the International Brotherhood of Electrical Workers. He succeeds Dan W. Tracy, recently ap-



EDWARD J. BROWN is new president of I.B.E.W.

pointed Second Assistant Secretary of Labor.

Mr. Brown has been a member of the Union since 1916 and in recent years has headed the Local Union in Milwaukee. He has been a member of the board of regents of the University of Wisconsin as a labor representative.



FOLLOWING FATHER'S footsteps, is James C. Hilton shown here with his dad, James S. Hilton, president of Rogers & Hilton, motor repair shop of Syracuse, N. Y. Mr. Hilton has been in the motor repair business since 1894 and during that time has been an active organization man, being a director of NECA from 1901 to 1920 and national treasurer of the same organization. Now he is priming his son for a career in the motor business and organization work.

MINERALLAC HANGER



Conduit 3/8"—2 1/2"
Cable to 2 1/8" (with Bushings)

Cadmium and Everdur
MINERALLAC JIFFY CLIP



Sizes from .250" O.D. Tubing
to 1 1/4" conduit.

See your Jobber

New York City Office
Theodore B. Dally
50 Church Street

MINERALLAC ELECTRIC CO.
25 N. Peoria St., CHICAGO

• CAPACITORS •

for MOTOR- STARTING



• It's easy to service capacitor-start refrigerators the Aerovox way.

The up-to-the-minute Aerovox listings indicate the exact replacement for any capacitor-start motor. And in the absence of motor identification means, there's the Aerovox Capacitor Selector which indicates what capacity to use. Then the Aerovox Emergency Capacitor gets the motor going in a jiffy and is later replaced by a regular replacement.

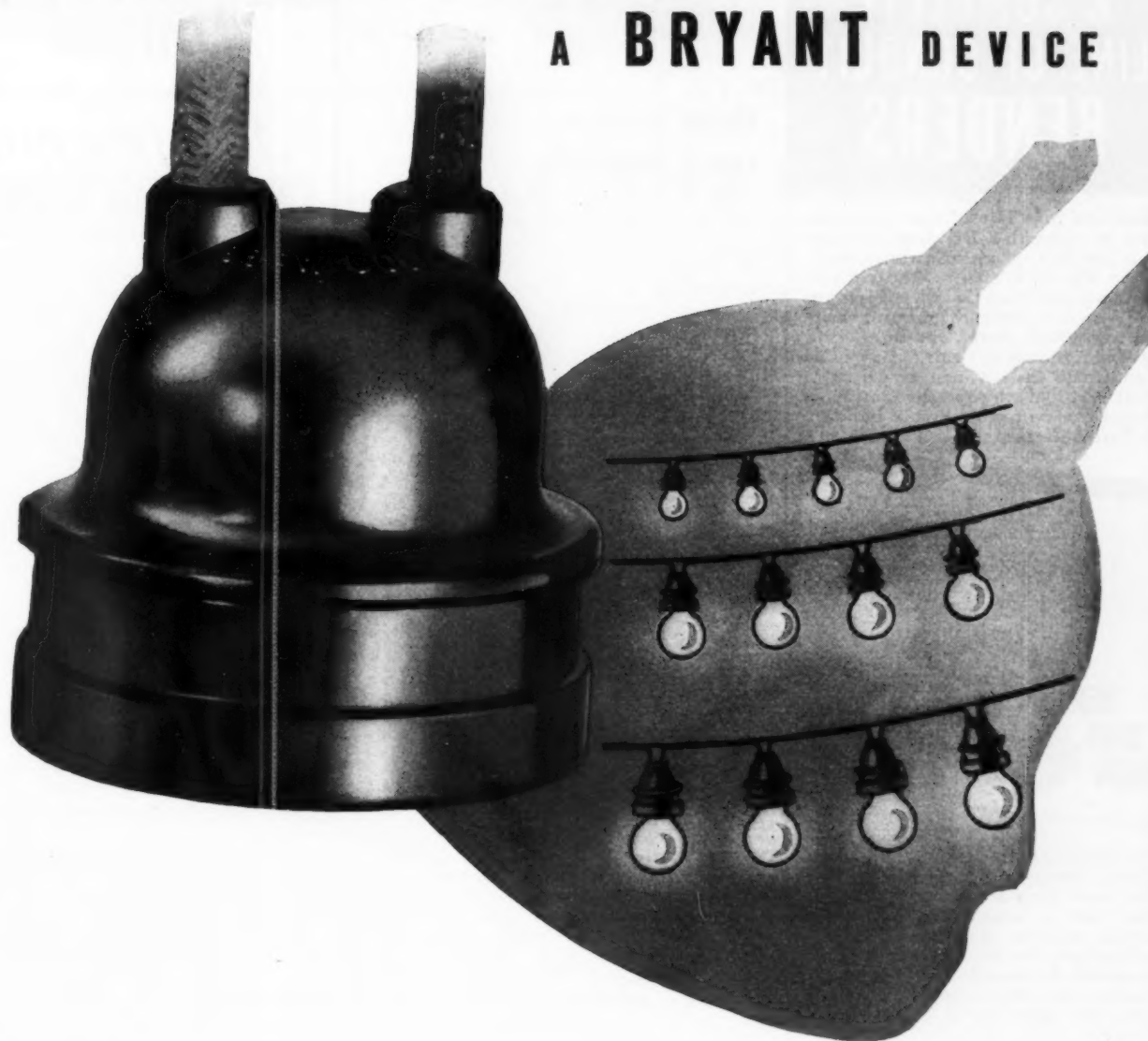
CATALOG . . .

Ask your local jobber about these Aerovox refrigerator servicing aids. Or write us direct for complete literature. Ask about the new low prices!

AEROVOX
NEW BRONX, N. Y.

EVERY OUTLET DESERVES

A BRYANT DEVICE



Weatherproof LAMPHOLDERS

Here is another Bryant Superior Wiring Device that means extra service and safety on the job. Bryant Weatherproof Lampholders are made of bakelite, composition and soft rubber to withstand weather and abuse. For holiday decorations, outdoor amusement and service areas, and for year-round emergency conditions, use these sturdy, dependable lampholders. Consult the Bryant Catalog which lists devices for every wiring need. Standardize on Bryant and be sure of high quality and superior performance.



*The Bryant Electric Company
Bridgeport, Connecticut*



SOLD THROUGH ELECTRICAL WHOLESALERS NATIONALLY

Since 1901 a subsidiary of **WESTINGHOUSE**
ELECTRIC & MANUFACTURING COMPANY

A COMPLETE LINE OF CONDUIT BENDERS

Here are just two of the complete line of Greenlee Benders for any size conduit, pipe, or tubing from 1/4 to 4 1/2-inch size. Small hand benders will handle all tubing up to 3/4-inch, while for rigid and thin-wall conduit, pipe, bus-bars, and the larger sizes of tubing, powerful hydraulic units are available. Write for detailed information about this complete line of benders and attachments.



The Greenlee No. 770 Bender shown above, designed for bending conduit and pipe from 1 1/4 to 3-inch size, has a maximum hydraulic piston pressure of 25 tons. A similar bender, the No. 775, has a more powerful hydraulic unit with a maximum piston pressure of 40 tons for bending 3 to 4 1/2-inch conduit.



This Greenlee No. 770-T Hydraulic Bender for bending thin-wall Electric Metallic Tubing, consists of the No. 770 Power Unit equipped with special attachments designed to make a full 90° bend quickly with one forward movement of the ram. These attachments are easily and quickly applied to the No. 770 Power Unit.

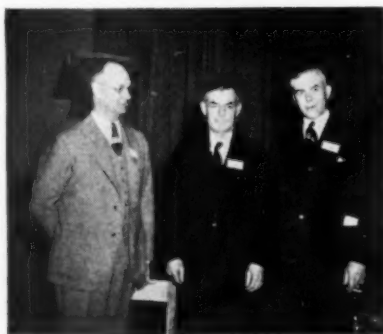
GREENLEE TOOL CO.

In the News

[FROM PAGE 64]

ADKINS ELECTED I.A.E.I. PRESIDENT

K. W. Adkins, Missouri Inspection Bureau, St. Louis, Missouri was elected president of the International Association of Electrical Inspectors for 1940. George E. Kimball, of San Francisco was elected first vice-president; W. L. Gaffney, Seattle, second vice-president; T. W. Bowry, Richmond, third vice-president; and J. D. Lynett, of New York, fourth vice-president and V. H. Tousley, Chicago, secretary-treasurer.



PROMINENT SPEAKERS at the opening meeting of the General Electric construction materials spring conference were: (left to right) J. H. Crawford, manager, construction materials sales division; Jasper McLevy, Mayor of Bridgeport; and H. L. Andrews, Vice President, General Electric and manager of the appliance and merchandise department.

CONTRACTORS ELECT OFFICERS

Meeting in Bismarck, N. D., the North Dakota Electrical Contractors Association elected the following officers on June 15: president, Charles Wood, Fargo; vice president, Art Oksendahl, Rugby; secretary treasurer, R. C. Melville, Bismarck.

In addition to the officers the following directors were elected: V. V. Dickinson, Devils Lake; B. K. Skeels, Bismarck and Earl McGrath, Lakota.

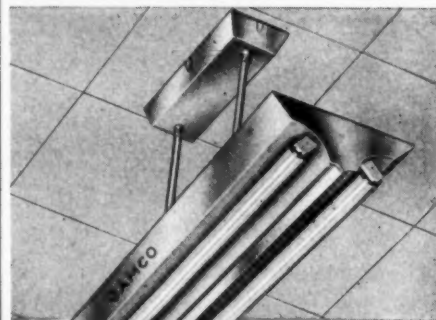
CERTIFIED RESIDENTIAL LIGHTING FIXTURES

The American Lighting Equipment Association has adopted a specification-certification program covering the design and lighting performance of all types of residential lighting fixtures. This program incorporates the Illuminating Engineering Society's "Recommended Practice for the Illumination Performance of Residential Ceiling Luminaires," and utilizes the in-

**GREENLEE
REFLECTORS**

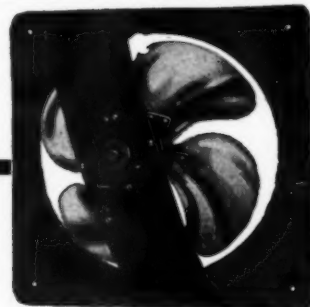
Suspension Type

Fluorescent LAMP FIXTURES



Ideally suited for lighting retail stores, beauty shops, drug stores, restaurants, etc. Easily taken apart for wiring. Attractive in appearance and has high reflecting efficiency. Send for booklet giving full details.

OVERBAGH AND AYRES MFG. CO.
411 S. Clinton St. Chicago, Ill.



AMERICA'S No. 1 VALUE

Here is the biggest Vent Fan value today. Nothing approaches it in quality, performance, and price. Features like these are unusual—enclosed motor with large oil reservoirs, chrome plated fan blades, streamline design, square panel for easy mounting, adjustable conduit box, horizontal or vertical operation. List prices:

10"	\$9.80
12"	12.50
16"	16.50

Write for complete information now.

SIGNAL ELECTRIC MFG. CO.
MENOMINEE, MICHIGAN
Offices in all principal cities

SIGNAL

WIRE AHEAD with **LEVITON**

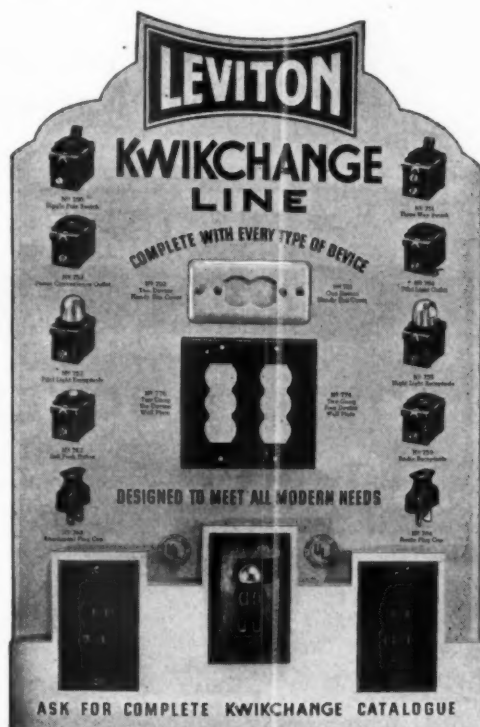
Quality

WIRING DEVICES

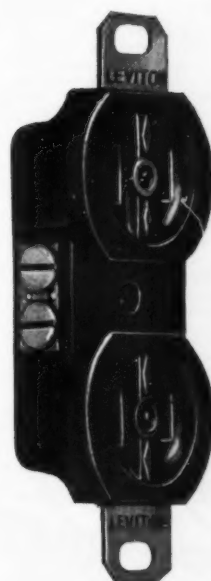


Ask for this complete catalog and data book. You'll find pages full of essential wiring devices—new and old, better made, better priced, and always in stock ready for prompt delivery.

The Kwikchange Line—increasing in demand. Its users know the reasons why. Try them on your important job and convince yourself.



← Typical of the Leviton line of popular priced switches is the 1030 line which is made of Bakelite fully enclosed and permanently assembled to stay put.



→ The 222 duplex receptacle is another example of Leviton leadership in the wiring device field. A quality item priced to suit the most economical demands.

Switches and Receptacles for every type of job—small and large, modest and elaborate. Leviton manufactures a full line of switches to meet all specifications and all budgets.

Say "Leviton" on your next order from your local wholesaler

LEVITON MANUFACTURING CO.

236 GREENPOINT AVE.
CHICAGO, ILL.
111 No. Canal St.

BROOKLYN, N. Y.
LOS ANGELES, CALIF.
420 S. San Pedro St.



McGILL LAMP CHANGER



Eliminate the hazards of falling off step-ladders, chairs or boxes while removing or inserting lamp-bulbs.

Popular for years with firms interested in cutting down industrial accident losses, the NEW model McGill Lamp-Changer has even further safe-guards embodied in its construction. Now, rubber-covered fingers with a coil spring around the tips, make for much quicker and easier removal or insertion of the bulb. The automatic locking device, between each pole-section, assures rigidity in every length of pole, up to the 30-foot maximum. The flexible joint, with cord attached, provides for easy operation at any angle.

Insulated for Safety



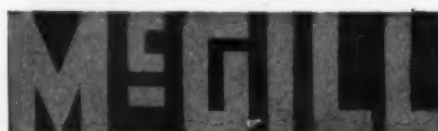
The McGILL Improved Lamp-Changer is insulated for safety. One section, including a 1 1/4-inch insert of insulating material prevents any shock or injury to the user, should the Lamp-Changer come in contact with exposed live wires. Regardless of the length pole you order for your Lamp-Changer, the insulated section is included.

Why run risks any longer in your plant? Send now for a McGILL Lamp-Changer to protect life and save costly accidents in your organization.

(Listed by Underwriters' Laboratories)

McGILL Products Can Be Secured from Your Electrical Wholesaler

McGILL MANUFACTURING CO.
Box No. 670 VALPARAISO, IND.



In the News

[FROM PAGE 66]

spection and certification services of the Electrical Testing Laboratories.

The newly certified fixtures will be identified by a certification tag which testifies that they conform to the lighting specifications and meet the approval of the ALEA Advisory Board of Design.

Under the terms of the program, manufacturer-members of ALEA will be required to submit samples of eligible fixtures to ETL for testing and inspection and to the ALEA Advisory Board of Design for approval.

A promotion activity to introduce these certified fixtures to the trade, professional groups and the general public is designed to enlist the active participation of utilities, electrical wholesalers, dealers and contractors.

CALIFORNIA PUSHING

S. D. WIRE

Northern California Electrical Bureau, previously called the Pacific Coast Electrical Bureau, Northern Division, has opened new quarters at Room 726-728 at 447 Sutter Street. George W. Barker is manager, Walter C. Heston is industrial engineer, and Clark Baker lighting counsellor. Exceptionally active on modernization work in office buildings, the Bureau is now promoting the use of small diameter wire to store owners and plant operators and advocating the modernization now.

NEW MODERNIZATION CAMPAIGN

The building industry, with the full cooperation of the Federal Housing Administration, is laying plans for a huge drive this summer to promote property modernization and repair. This nationwide campaign is planned to break simultaneously in all sections of the country in mid-August and, being patterned closely after last summer's successful drive, will again stress "Fix Up Your Home! Modernize." The convenient monthly payments on the FHA Plan of installment buying will be featured.

In line with industry's cooperative suggestions and plans to make the most of this program, FHA is again preparing literature and display material for the trade. This will be available at headquarters in Washington or through the 64 FHA field offices about the middle of this month. National advertising through mail, car cards, radio and a Technicolor movie of "before and after" of modernization is being planned by FHA.

Home owners may secure a FHA loan to cover cost of both labor and material for repairs, remodeling, decorating, landscaping and the installation of new plumbing, heating or wiring systems.



WOLVERINE SOLDERING LUGS

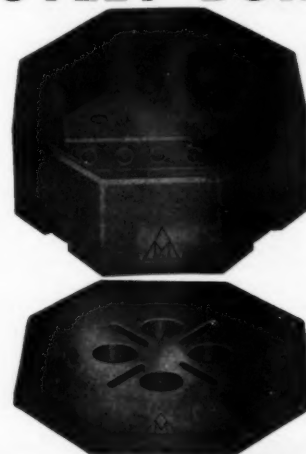
- High-Conductivity
- Square-End
- Uniform Dimensions

BUY FROM YOUR JOBBER



WOLVERINE TUBE CO.
DETROIT, MICHIGAN

Profit by USING ILLINOIS Dependable Porcelain OUTLET BOXES



★ Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency.

Contractors who use these products not only establish themselves most securely with their customers but also build their business by making each job a true quality one. Send for bulletin.

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILL.

DOUBLE USE



J-K CLAMP BOXES

The J-K Cable Box with *external* clamps was designed by Raco • All-Steel to conserve space *inside the box* for additional conductors and splices. This is especially important when you consider that the National Electric

Code restricts the number of wires that can be used in a box to a definite ratio to its cubic capacity.

A *smaller* J-K Box with external clamps can be used more efficiently than a *larger* conventional box with internal clamps. No space is wasted inside the J-K Box.

USED WITH BOTH TYPES OF CABLES

FOR METALLIC CABLES—The J-K Box has 2 *bushed* openings as required by the Underwriters, to protect the conductors from injury. The cable is held securely by a strong clamp in the housing, while the 2 Pri-outs are easy to remove.

FOR NON-METALLIC CABLES—The J-K Box has a unique arrangement adapting it for use with Non-Metallic Cables. Good wiring practice requires that Non-Metallic Cables be gripped well back from the cut and frayed end of the cable sheathing. We afford this facility by a K.O., which entirely surrounds the bushed openings required for the installation of Metallic Cables.

One Box—2 Services—Double Use

FOR BOTH TYPES—The J-K Box is equally suitable for, and can be used interchangeably with, either metallic or non-metallic cables—or both types in the same box if desired.

The J-K Box was developed and pioneered over a period of years by RACO • ALL-STEEL, during which it gained an ever-increasing NATIONAL ACCEPTANCE. And although



J-K BOX
USED WITH METALLIC CABLE



J-K BOX
USED WITH NON-METALLIC CABLE

it may be copied, no imitation could serve the same wide range of utility as the genuine J-K Box!

Genuine J-K Boxes are protected by U. S. Patents, No. 2,000,850 and No. 2,000,851. Other patents are pending.

Jobbers: With the J-K Box, you can supply your trade with an appropriate type clamp box for either metallic cable or non-metallic cable or both.

Made in 2 sizes (3¼" or 4") octagon, with or without fixture studs—black or galvanized. *Assembled on bar hangers if desired.*

The J-K Box is only one of many nationally famous RACO • ALL-STEEL • ELECTRICAL PRODUCTS. Write for catalog—you will be under no obligation to learn about these better products with their many advantages for rural and urban modernization work, as well as on new jobs.

Distributed nationally by

ALL-STEEL-EQUIP COMPANY
INCORPORATED

608 Griffith Avenue, Aurora, Illinois
Factories: South Bend, Ind.; Aurora, Ill.



RACO • ALL-STEEL • PRODUCTS

Switch Boxes • Outlet Boxes • Cutout Boxes • Cabinets • Conduit Fittings
Distributors in All Important Centers



For Best Results Use G-E FITTINGS



Every experienced contractor knows that G-E Fittings enable him to make fast, safe, secure installations. No makeshift connections need to be made when G-E Fittings are used. Exactly the right fittings in the right size are available for any job. There are different G-E fittings designed especially to use with rigid conduit, flexible conduit, E. M. T. Fiberduct underfloor raceways, service entrance cable, BX, BraidX, and Trial Installation Cable.



A few of the many fittings in the G-E line.

G-E Fittings are high-quality fittings—sturdy, dependable, easy to use. Try them on your next job. See how neatly and quickly installations can be made with them. For further information, see the nearest G-E Merchandise Distributor or write to Section C-0128, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC



[FROM PAGE 68]

NECA OPENS WASHINGTON OFFICE

The National Electrical Contractors Association has opened an office in the Barr Building, Washington, D. C., to secure a closer contact with present government activities of concern to the electrical construction industry. Paul M. Geary, formerly secretary of the Youngstown Contractors Association, and who for the past year has been engaged in field work for the NECA Labor Relations Committee, now becomes special representative of NECA, with headquarters at this office.

—WITH THE— *Manufacturers*

G-E Changes

George Campbell of Schenectady has been appointed manager of the Buffalo office of the General Electric Company. He succeeds George H. Calkins, who retired on July 1.

Ralph M. Darrin of Buffalo, has been made manager of the Syracuse office, E. H. Aussicker of Binghamton, manager of the Schenectady local office and E. B. Currie of Rochester manager of the Binghamton office.

The Mid-State Electrical Supply Co., Inc., Lynchburg, Va., has been appointed distributor for G-E wiring materials and will continue to handle G-E electric clocks and heating devices.

Pittsburgh Reflector Appoints New Officers

E. W. Simons, president of Pittsburgh Reflector Company, announces the election of the following new officers and directors:

John A. Hoeveler, manager of the Engineering Department, has been named first vice-president and member of the Board of Directors.

W. K. Yonge has been named vice-president in charge of manufacturing. He continues as a member of the Board.

H. C. Zinsmeister, auditor, has been appointed treasurer and elected to the Board.

R. C. Fiske was promoted to secretary and elected a member of the Board.

Dongan Electric Manufacturing Company of Detroit, Mich., announces the appointment of George R. Koeln to its field sales staff. Mr. Koeln's headquarters are at Atlanta, Ga. and he covers the southeastern states.

Callite Tungsten Corporation, Union City, N. J., has acquired Harris Alloys, Inc. The business of the former Harris Alloys will be conducted as a division of and under the corporate name of the Callite Tungsten Corporation. Frederick T. Harris, former Harris executive head, joins the Callite Tungsten staff and will have charge of operations of this new division. Sales activities will be under the supervision of D. R. Donovan, general sales manager of the Callite Tungsten Corporation.

Clark Controller Changes

The Clark Controller Co. of Cleveland, Ohio, has made the following changes in its district sales organization:

E. R. Anderson is in charge of the district office in Baltimore, with headquarters in 1732 Baltimore Trust Bldg.

Robert H. Hoge is in charge of the Gary, Ind. district office, located at 821 Gary State Bank Bldg.

William Suk opens a district office in Springfield, Mass., with offices at 95 State St.

E. R. Baruch of the Standard Electric Mfg. Co., of 2020 Richardson Ave., Dallas, Tex., will be manufacturer's agent in this city.

At Tampa, Florida, this line will be represented by Pat Flanagan, Box 445, Tampa.

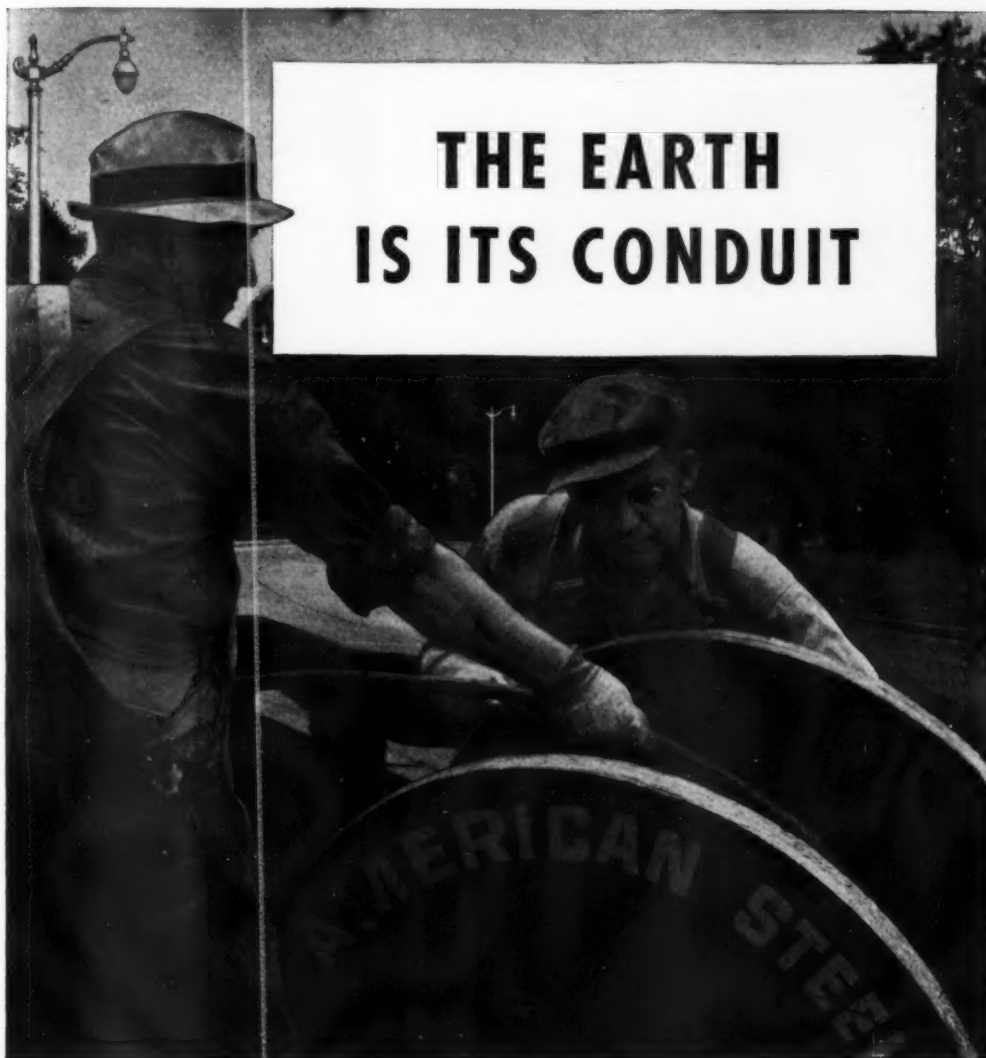
Cutler-Hammer, Inc. has moved its Pittsburgh office to new and larger quarters, in the Park Building at 355 Fifth Avenue. T. S. Towle is manager of this territory.

Roller-Smith Company, Bethlehem, Pa. has appointed B. S. Woodman as a special representative. Mr. Woodman, who will be engaged in sales engineering, formerly was with the Wagner Electric Corporation as special representative and branch manager of the Philadelphia territory. He will make his headquarters at Bethlehem.



TOURING THE EXHIBITS of the Electrical Maintenance Engineers Exposition at Milwaukee were James Brower, chief engineer, Milwaukee Sewerage Commission; Fred Masek, Trico Fuse; Frank W. Koepke; Morley Murphy; Al Kopald, I. A. Bennett & Co.; Steve Murphy, Graybar; and George Andrae, Herman Andrae Electric Co.

THE EARTH IS ITS CONDUIT



AMERSEAL PARKWAY CABLE

gives lasting service buried directly in earth



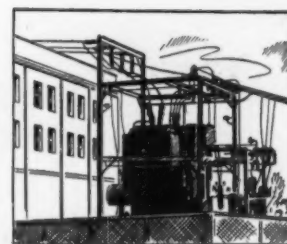
NO ducts. No conduit. No external protection of any kind. That's the reason why contractors and engineers prefer to use Amerseal non-metallic Parkway Cables. They can be laid directly in an ordinary plowed furrow or hand-cut trench. They save time . . . save materials . . . save money.

The conductors are tightly sealed in a moisture-proof jacket of tough, lively rubber, and further protected by a covering of asphalted jute. Neither moisture nor earth acids and alkalis can penetrate. In hundreds of

installations, Amerseal has proved its ability to give years of trouble-free service at rock-bottom cost.

Amerseal is versatile. You can bury it directly in the ground, run it up a pole, attach it to a structure, or string it on a messenger. In every application you'll find it effective.

For circuits which require more positive protection against physical damage, use our metallic types of Parkway Cable, sheathed in lead and armored with steel or bronze. Send today for our complete catalog of Parkway Cables.



PAPER INSULATED CABLE



AMERBESTOS CABLES



VARNISHED CAMBRIC CABLES



RELIANCE WEATHERPROOF
WIRES



AMERCLAD CABLES



BUILDING WIRES

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago



and New York

Columbia Steel Company, San Francisco, Pacific Coast Distributors

United States Steel Export Company, New York

UNITED STATES STEEL

EQUIPMENT *News*

Floodlight

A new aluminum floodlight, designed for sports lighting but applicable to other installations, has been developed. Designated Type L-68, it features vertical adjustment of 240 degrees, slide-type door and resetting ring. These provide safety and simplicity in servicing. It permits closer mounting by eliminating need for servicing space between lights. After toggle latch is unsnapped, a pull on door handle slides door glass frame off floodlight. Frame is attached to reflector by heavy-duty chain and may be hung out of way during servicing. Unit available with or without door glass assembly. Incandescent lamps of 750, 1000 or 1500 watts can be used. General Electric Co., Schenectady, N. Y.



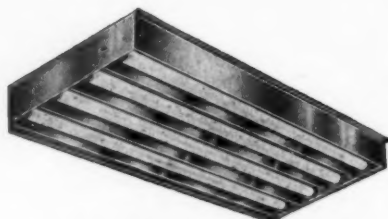
G-E SPORTS FLOODLIGHT

Diffuser

A new plastic diffuser which snaps onto fluorescent lamps and reduces glare from bare lamps. It is recommended for commercial use. It is called "P-F-C" (plastic fluorescent channel) and is applicable for both 1-in. and 1½-in. lamps. Available in five colors—white, light blue, yellow, pink and pale green. They are decorative as well as functional. Diffusers are shatterproof. Edwin F. Guth Company, 2615 Washington Blvd., St. Louis, Mo.



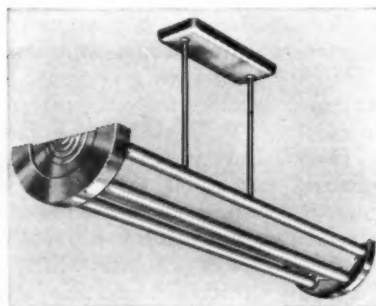
GUTH PLASTIC DIFFUSER



DAY-BRITE WINDOW REFLECTORS

Window Reflectors

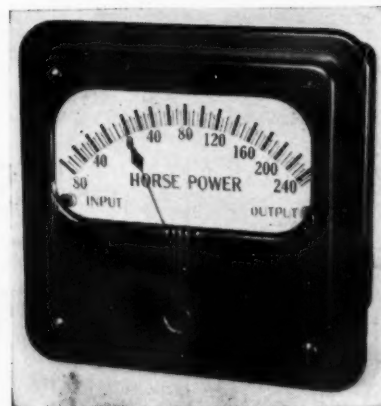
These fixtures are designed for lighting all types of show windows. Available for two, three and four, 18-, 24-, 36- and 48-in. fluorescent lamps. Fixtures made of steel, finished in aluminum lacquer. Mounting holes are conveniently located for installation and ½-in. knockouts are furnished in top, ends and back for electrical connections. Ends are punched so that two or more units can be used for continuous installations. Each fixture complete with sockets, ballasts, lamp starters and wire leads. Starting compensators furnished with all units using Tulamp ballasts. Day-Brite Lighting, Inc., 5401 Bulwer Ave., St. Louis, Mo



MILLER FLUORESCENT FIXTURE

Lighting Fixture

A new fluorescent fixture designed for commercial use. Dimensions are: length 49-inches, width 11½-inches, depth 5½-inches, overall height 29½-inches with 24-inch tube stems. Ceiling canopy is 16½-by 6-inches. It uses 4-40-watt, 48-inch mazda fluorescent lamps. Voltage is 110-125, 60 cycle a.c. Wired complete, with Tulamp reactors, starting compensators and removable starting switches. Power factor corrected to 95 per cent or above. The Miller Company, Meriden, Conn.



WESTINGHOUSE WATTMETER

Instrument

A d.c. wattmeter which operates from a standard 50 millivolt ammeter shunt has been developed. Magnetic field is produced by electromagnet energized from line voltage. Existing shunts and long, small wire shunt leads as for ammeters, may be used for current circuit. Available in conventional 5½-in. square or 7½-in. round switchboard cases to match other switchboard instruments. Principal application is to variable voltage, d.c. power circuits or control, but may be used wherever a measurement of power is desired on any d.c. circuit. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Motors

A new line of vertical single phase motors, available in sizes from ¼ to 5 hp., is for operation in isolated localities where small pumping units are often located. Design prevents water from reaching vital parts. Frame, bearing brackets and enclosing covers give protection consistent with adequate ventilation. Solid or hollow shaft modifications can be furnished. Operating speeds are 1200, 1800 and 3600 rpm. All 1800 rpm. and lower speed motors are built in repulsion-start induction-run type. Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago, Ill.



FAIRBANKS, MORSE MOTOR

A RICH TERRITORY ... UNEXPLORED



THE demand for fast interior communication has created—at your doorstep—a rich market for Automatic Electric private telephone systems—a market so far practically unexplored.

Offices, stores, shops, factories, and homes too, recognize the need for efficient intercommunication facilities. They are waiting for you to sell them. You can get your share of this business by making it known that you can provide them with exactly the equipment to meet their needs.

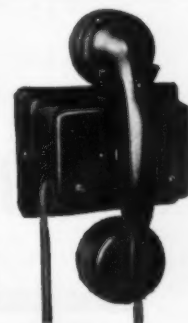
Recommend Automatic Electric private telephones to your present customers. You'll uncover a wealth of new

SELL IDEALFONES

High Quality Interior Telephones—at Popular Prices

Start making those extra profits by selling Idealphones—the latest addition to the Automatic Electric line.

There are four Idealphone systems—ranging from two to ten stations—requiring but two types of telephone instruments.



business. And if you need help, call in your local electrical wholesaler. He will be glad to provide you with literature and prices on our complete line.

These systems are designed for private service. They are not intended to be connected with the public telephone system.

AUTOMATIC ELECTRIC

PRIVATE INTERIOR TELEPHONE SYSTEMS

Distributed by: AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 West Van Buren Street, Chicago, Illinois

Sales and Service Offices in Principal Cities

In Canada: Canadian Telephones & Supplies, Limited, Toronto

Electrical Contracting, August 1940

ADVANCE NOTICE!

OF A TWO-FISTED EDITORIAL JOB FOR YOU IN OCTOBER ELECTRICAL CONTRACTING FIRST

→ LIGHTING INSERT

Better than ever this year! For the editors of Electrical Contracting will give you a whole series of case studies of industrial, commercial and outdoor lighting—practical, down-to-earth installations, every one of them. Both fluorescent and incandescent will be covered. You'll want to keep this material for year-round use.

PLUS

→ 1940 NATIONAL ELECTRICAL CODE

An analysis of the changes in the new Code, written and illustrated in a simple, easy-to-understand fashion. This is the best way we know of for keeping up to date on this important subject.

ALSO

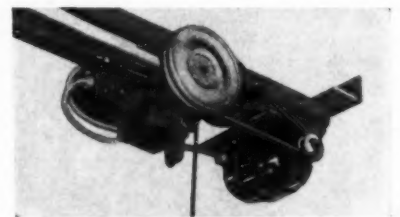
material on the National Electrical Contractors Association Convention, to be held in Jacksonville in October. The official program will be included.



[FROM PAGE 72]

Electric Door Operator

This electric door operator has mono-button control, which is single contact momentary type. Door continues to move after finger is removed from button. Door stops automatically in fully open or close position. Door will open, close or reverse instantly from any position when moving or at rest. Door can be stopped in any position by throwing stop switch to "off" and door will start again when stop switch is thrown to "on". Model 5R operates on 24-volt control and transformer is part of standard equipment. Floating power gives safety feature, as door can be stopped electrically if it meets an obstruction in either direction of travel or door can reverse and open automatically if door meets obstruction while traveling downward. Doors and Operators, Inc., Tiffin, Ohio.

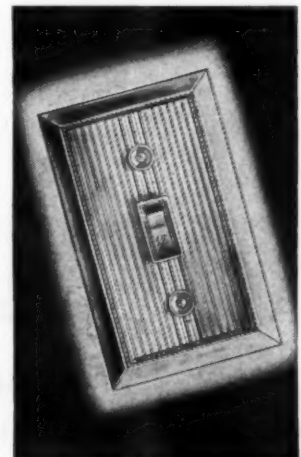


ELECTRIC DOOR OPERATOR



Switch Plate

Electric switch and receptacle plates made of a new plastic material, which gives a visible glow in the dark. Plates are not phosphorus treated nor radio active, but absorb and store up light. Under light, plates appear as ordinary ivory plastic, but through the night give off a fluorescent glow. Five minutes exposure to natural or artificial light recharges them. Available for standard toggle and push-button type switches and for two outlet receptacles. National Plastics, Inc., 1003 Power Ave., Cleveland, Ohio.



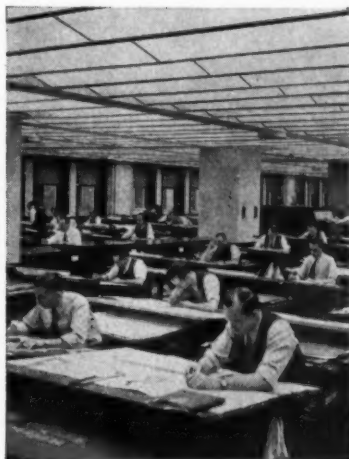
NATIONAL PLASTICS SWITCH PLATE

FLUORESCENT DAYLIGHT

IS DAWNING EVERYWHERE



In Industry
For Better Production



In Offices
For Greater Accuracy



In Stores
For Increasing Sales



In Theatres, Hotels, Clubs
For Beauty

Revolutionary Light Source Brings YOU New Business!

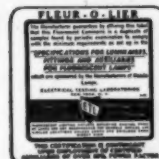
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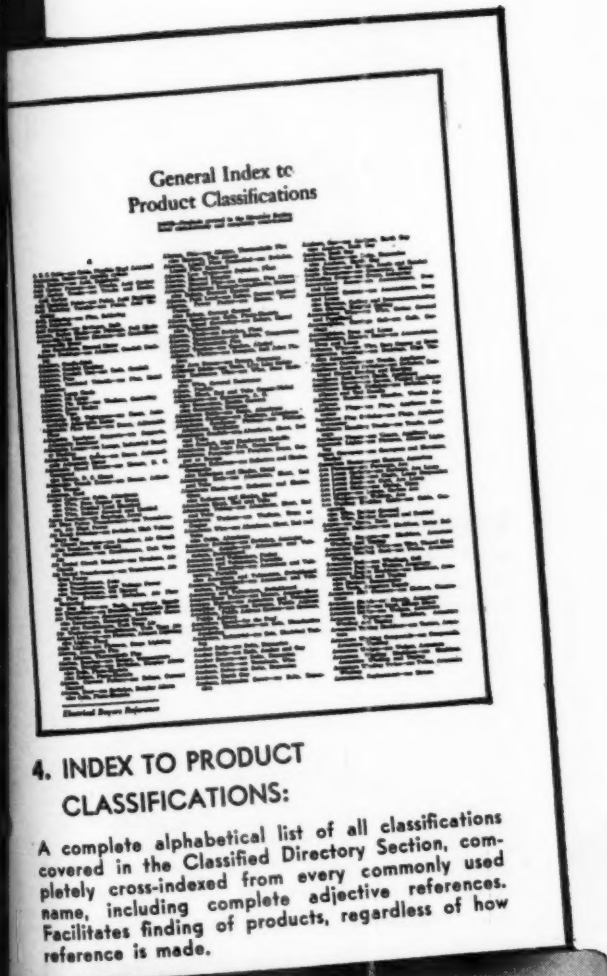
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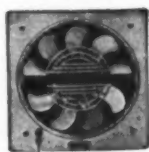
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EQUIPMENT *News*

[FROM PAGE 74]

Outlet Boxes

A double-end outlet box has been developed for installation in thin wall partitions. It is made of new shallow covers and re-designed extension ring. Combination of two of the covers with ring permits installation of two switches or outlets beside each other in same box but facing opposite directions. Two rooms can be supplied from a single run of conduit or cable. Extension ring is 4-in. square and 1½-in. deep. Ears on each end are drilled and tapped so that covers can be mounted in any position. General Electric Co., Bridgeport, Conn.



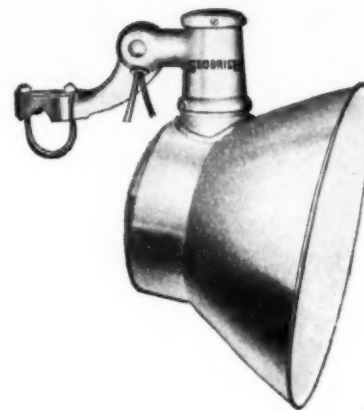
G-E OUTLET BOXES

Midget Relay

A new midget relay, known as Bulletin 105, has been developed. Designed for use on either a.c. or d.c., it is available with contacts arranged for single pole, normally open, normally closed or double throw. Relay is rated to handle approximately one horsepower and furnished with coils for operation on standard voltages, up to 110/115-volts at standard frequencies. On 220/230-volts; coils can be supplied for not less than 50 cycles. With base, dimensions of 2½-in. by 1½-in. and overall depth 1½-in., relay can be mounted in wall type push button box. Ward Leonard Electric Co., Mt. Vernon, N. Y.



WARD LEONARD MIDGET RELAY



GOODRICH ALUMINUM FLOODLIGHT

Floodlight

Three styles of Lumo aluminum floodlights are available for long, medium and close range illumination. Designed for accurate light control and high efficiency, may be used individually or in combination to obtain uniform intensities over large areas. Constructed of aluminum and made in both open style and with heat resisting glass lens. Available for pole or crossarm mounting. Installation, wiring and servicing is facilitated by two piece hood construction with removable caps. Goodrich Electric Co., 4600 Belle Plaine Ave., Chicago, Ill.



APPLETON GROUNDING WEDGE

Grounding Wedge

The new "Loxbox" grounding wedge provides a simple grounding bond between conduit and box. Consists of wedge-shaped clamping ear which hooks into rectangular-shaped slot over knockout in interior of outlet box. Screw is then tightened with its sharp-pointed extremity biting into locknut or bushing. Positive electrical continuity between box and conduit is insured by biting action of screw and wedging pressure of clamp against corners of rectangular slot. Wedge can be used to ground regular bushing or notched locknut on connector of thin-wall conduit. Appleton Electric Company, 1701 Wellington Ave., Chicago, Ill.

Indicator

Explosion-proof and dust-tight pilot light indicator designed with sealed connections, eliminating use of sealing fittings where conduit enters housing. Accommodates standard S-6 6-watt bulb. May be relamped by unscrewing unit assembled bezel. Furnished with clear, green or ruby globe in single and two-gang for either surface or flush mounting. Russell & Stoll Co., 150 Park Place, New York.



RUSSELL & STOLL
INDICATOR

Lamp Holder

A new bakelite fluorescent lamp holder with a sure locking feature. Lamp is inserted or removed by a push button method. Contacts hold lamp in place so that it cannot move out of position unless released by push button again. It has tapped bracket to simplify assembly in fixtures. Available in either black or white plastic. Kulka Electric Mfg. Co., Inc., 30 South St., Mt. Vernon, N. Y.



KULKA LAMP HOLDER

Bar Hanger

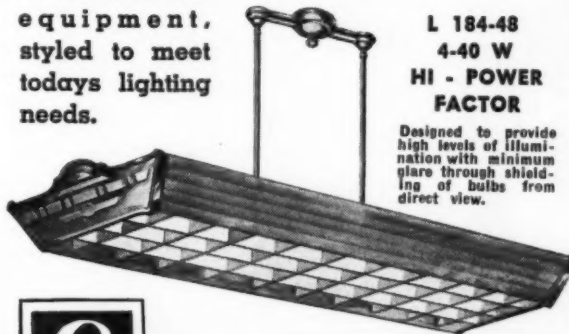
The BAR- $\frac{3}{4}$ -in. adjustable bar hanger is new in design and allows for an extra sturdy installation with most styles of outlet, ceiling and cable boxes. It does not interfere with cable, conduit or wires and is also useful for conduit, cable or knob and tube work. Made in one complete unit. Bar with $\frac{3}{4}$ -in. sliding fixture stud and locknut permits complete adjustment of outlet box between joist or studding at proper height. Appleton Electric Co., Chicago, Ill.



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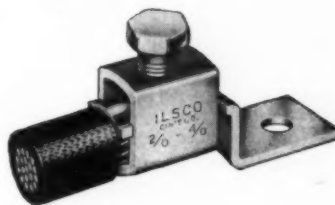
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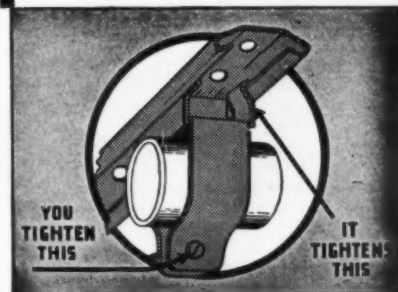
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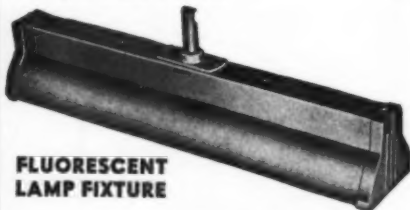
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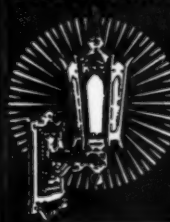
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*See 1939-1940 Buyers' Reference number of Electrical Contracting for additional information on these companies and their products.

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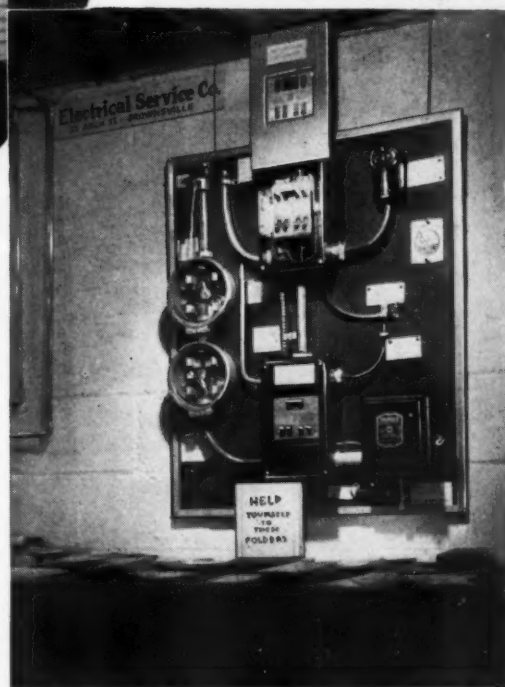
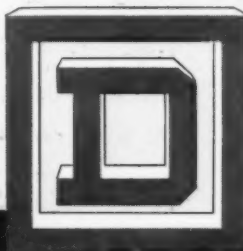


HERBERT MILLER,
owner and manager of the
Electrical Service Company,
Brownsville, Pennsylvania.

● Here is an example of aggressive selling by an electrical contractor. He said to the builder, "Let's install an ideal electrical job and merchandise it to the thousands of people who will inspect this model home. It will help you sell homes and help me to get more and better wiring jobs." The idea appealed to the builder, so—

Wiring layout and specifications of the highest standards were adopted. A demonstration panel was installed in the basement, showing visitors the exact wiring arrangement. An attendant explained the advantages of adequate wiring—including **SQUARE D MULTI-BREAKERS**.

The contractor got results. In addition to fine publicity, he actually signed up wiring contracts that meant real money. Isn't this an idea you can use profitably?



(Above) The demonstration panel displayed in the basement of the demonstration home. Notice that **Square D Multi-breakers** are a major part of this ideal layout which provides for future as well as today's requirements. Prospective home buyers are quick to appreciate the desirability of Multi-breakers which eliminate fuses and the inconvenience of replacing them. They are surprised to learn that they cost little, if any, more than ordinary fusible equipment.

CALL IN A SQUARE D MAN

SQUARE D COMPANY

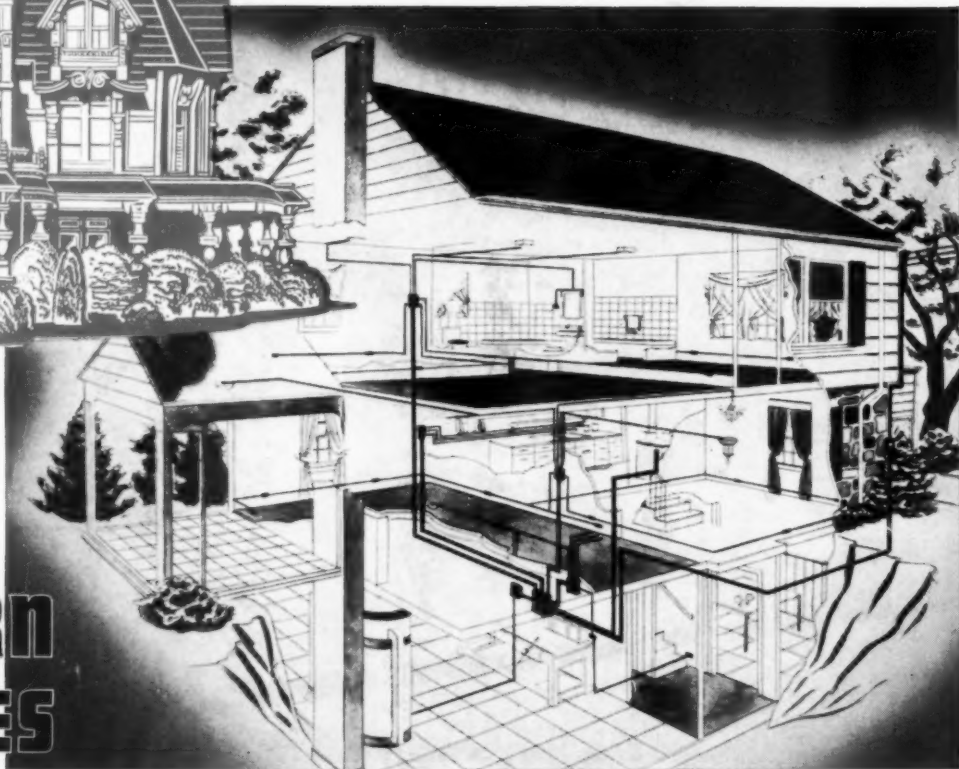
DETROIT - MILWAUKEE - LOS ANGELES

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO



*Wiring was simpler
years ago*

**MODERN
HOMES**



NEED MODERN WIRING

*Nowadays wiring must
serve many appliances
and lamps*

YOUR house wiring customers will benefit, and so will you, if you sell and install adequate wiring. Skimpy wiring was all right in the early 1900's when electricity was only used for lighting. But today people want to use the many electrical home appliances that are available.

INSTALL G-E HOME WIRING

G-E Home Wiring enables home owners to use modern appliances conveniently and efficiently. It makes modern lighting possible and furnishes convenient control of lighting. Ample outlets are provided, wire sizes are big enough and the design of the system avoids long runs. G-E Home Wiring jobs are naturally more worth while for contractors to install.

USE G-E WIRING MATERIALS

G-E Wiring Materials for use in installing G-E Home Wiring include: G-E White Rigid Conduit, Service Entrance Cable, BX, BraidX, Wire and Cable and Wiring Devices including two modern switch lines—a silent sphinx Mercury Switch and a standard switch completely insulated with Textolite. These materials are all of high quality, are designed to be used together and will give long dependable service.

For Further Information

For further information about the G-E Home Wiring or G-E Wiring Materials see the nearest G-E Merchandise Distributor or mail the coupon at right for a Bulletin on G-E Home Wiring and on G-E Materials.



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